



# COMMERCIAL FISHERIES ABSTRACTS

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FISH TECHNOLOGY EXPERIMENT STATION,  
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UNITED STATES DEPARTMENT OF THE INTERIOR  
U.S. FISH AND WILDLIFE SERVICE  
BUREAU OF COMMERCIAL FISHERIES





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0.112	BUGWATCHING BY COMPUTER	Davenport, Demorest (Zoology Department, University of California, Santa Barbara) New Scientist 42, No. 655, 692-693 (June 26, 1969)	In the investigation of motile behavior in microorganisms, one needs to observe and at the same time to record quantitatively the movements of individual cells in an open, unrestricted preparation. He needs to be able to change at will the conditions--for example, the illumination, salinity, temperature, or concentration of chemical agents--in the preparation during an experiment without restricting the free movement of the microorganisms. And in some investigations, he needs to be able to record simultaneously the movements of a number of individual cells as distinct entities in a mass of cells. The author has developed a computerized apparatus for satisfying these requirements.	The basic optical element is an inverted microscope with all magnifications from 20X to oil, with phase contrast and dark field. The illuminator is far enough from the stage to mitigate the effects of heat, and the large, open stage with objectives below provides maximum freedom for manipulation of a free, open preparation. Thus a veritable aquarium of microorganisms can be put on the stage and focussed upon with either a low-power or a long-focus, high-dry lens.	The electronic elements consist of a TV camera with camera control and monitors and a video tape recorder. The camera looks at the optical image directly (over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 22 NO. 11 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: L. Baldwin
0.12 (0.8)	LOW OXYGEN: BACK ON MENU	Anonymous Chemical Week 105, No. 4, 28 (July 26, 1969)	The manufacturer of the newest system uses fixed-location equipment to draw air in from the storage area, remove most of the oxygen and carbon dioxide, and return it to the cold room, where the combination of cold and low oxygen keeps oxidation and decomposition at a minimum. The system has two components: an oxygen converter and a carbon-dioxide scrubber. The converter uses a special catalyst to combine propane (from 1 to 2 pounds per hour) with oxygen; most of the heat of the reaction is removed by a direct water spray installed in the converter. The scrubber consists of two sets of molecular sieves through which the air treated by the converter passes. One set of sieves removes carbon dioxide and trace contaminants from the air while the other set, the one not in use, is heated to between 350° and 400° F. to drive off adsorbed gases and regenerate the sieves.	The only other manufacturer of controlled-atmosphere systems uses liquid nitrogen (at -320° F.) to keep storage temperatures down and to control oxygen content.	(over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 22 NO. 11 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: L. Baldwin
0.321	TRIPLET-SINGLET ENERGY TRANSFER IN PROTEINS	Galley, William C. (Department of Chemistry, McGill University, Montreal, Quebec, Canada), and Lubert Stryer (Department of Molecular Biophysics and Biochemistry, Yale University, New Haven, Connecticut 06520) Biochemistry 8, No. 5, 1831-1838 (May 1969)	The transfer of electronic excitation energy between chromophores is of three known types: singlet-singlet, triplet-singlet, and triplet-triplet. Many examples have been given of singlet-singlet transfer in proteins, and recently (1968) the present authors demonstrated triplet-triplet transfer in an enzyme-inhibitor complex, thereby providing evidence for the presence of a tryptophan residue near the active site. In the present article, they show that triplet-singlet transfer can occur in proteins.	The system studied was a complex of proflavin and $\alpha$ -chymotrypsin in which the tryptophan residues of chymotrypsin were the triplet energy donor and the proflavin bound at the active site served as the singlet acceptor. The triplet-singlet transfer was revealed by a delayed fluorescence from the proflavin and a selective quenching of the tryptophan phosphorescence. The transfer efficiency in the proflavin-chymotrypsin complex was greater than 80 percent. This efficiency and the kinetics of the delayed proflavin fluorescence and of the residual tryptophan phosphorescence revealed at least two classes of tryptophan residues; their rate constants for triplet-singlet transfer were 20 and 2.2 sec.	(over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 22 NO. 11 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: L. Baldwin
0.35 (9.19)	MICROSOMAL EPOXIDATION: EFFECT OF AGE AND DURATION OF EXPOSURE TO DIETARY DDT ON INDUCTION	Gillett, James W. (Department of Agricultural Chemistry, Oregon State University, Corvallis) Bulletin of Environmental Contamination and Toxicology 4, No. 3, 159-168 (May-June 1969)	Because of the existence of poisonous pesticide residues in our environment, studies have been made on the possible interaction of these compounds with microsomal metabolism. Certain compounds, such as DDT, show inductive effects on the microsomal mixed function oxidases active in the metabolism of drugs and pesticides. The extent of induction of microsomal epoxidation is dependent on the concentration of DDT in the diet and has a "no effect" dietary dosage level of between 1.0 and 5.0 p.p.m.--in the same range as for certain drugs (for example, toxaphene) metabolizing activities (Gillett, Chan, and Terriere 1966; Gillett, 1968; Kinoshita, Frowley, and Dubois, 1966). A single large dose of DDT is capable of maintaining elevated microsomal drug metabolism for several weeks. Little is known about the persistence of the effects of low dietary dosages of chlorinated hydrocarbon insecticides. Therefore, the present study was carried out to provide further information to aid in the evaluation of dietary chlorinated hydrocarbon insecticides as possible public health hazards.	(over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 22 NO. 11 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: F. T. Piskur	







<p>0.38</p> <p>EFFECTS OF SELENOCYSTINE AND SELENOMETHIONINE ON ACTIVATION OF SULFHYDRYL ENZYMES</p> <p>Dickson, R. C., and A. L. Tappel (Department of Food Science and Technology, University of California, Davis 95616) Archives of Biochemistry and Biophysics <u>131</u>, No. 1, 100-110 (April 1969)</p> <p>Information is needed on the biochemical functions of selenium compounds because (1) the trace element selenium apparently is an essential nutrient in plants, microorganisms, and animals, and (2) recent studies indicate that pathological conditions arise from selenium-deficient states. A major difficulty in relating nutritional evidence to biochemical studies is that the level of selenium in normal tissues occurs in parts per million. Recent research studies have dealt with the antioxidant properties of selenium and the protection afforded by various selenium compounds to amino acids and proteins against free radical damage resulting from peroxidative conditions or ionizing radiation. In the present study, the authors explore the effect of the selenoamino acids, as compared with that of analogous sulfur amino acids, on the activity of sulfhydryl enzymes.</p> <p>The authors found from these studies that selenocystine catalyzes the activation of papain and glyceraldehyde-3-phosphate dehydrogenase and the inactivation of ribonuclease, which takes place through sulfhydryl-disulfide exchange reactions with sulfhydryl compounds. Because the catalytic effect occurs at pH 7 (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>Abstracter: F. T. Piskur</p>	<p>0.5 (2.05)</p> <p>CHARACTERISTICS OF MYXOBACTERIA ISOLATED FROM THE SURFACE OF FRESHWATER FISH</p> <p>Pacha, R. E., and Sook Porter (Department of Microbiology, Oregon State University, Corvallis 97331) Applied Microbiology <u>16</u>, No. 12, 1901-1906 (December 1968)</p> <p>Certain myxobacteria are pathogenic to both fresh water and anadromous fish; both natural and hatchery populations of fish are susceptible. Serious economic losses have occurred in populations of fish as a result of the diseases the organisms cause. Nonpathogenic myxobacteria have been found on the skin and gills of fresh-water fish. On the basis of the morphology of the colonies, some of the nonpathogenic myxobacteria could be easily confused with the pathogenic species. The purpose of the present study was to characterize the saprophytic myxobacteria that occur on the surface of fish and to determine the degree of similarity between those organisms and known pathogenic species.</p> <p>Thirty-two strains of nonpathogenic myxobacteria were studied. The organisms were isolated from fish taken at various locations in the Pacific Northwest. Both fresh-water and anadromous fish were used as the host source of bacteria. One culture of <i>Chondrocyclus columnaris</i> and one of <i>C. psychrophila</i> (both pathogenic) were used for comparative purposes. Morphological, cultural, biochemical, and serological studies were carried out on all strains. (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>Abstracter: F. T. Piskur</p>
<p>0.5 (9.19, 2.3)</p> <p>VIRAL DEPURATION BY ASSAYING INDIVIDUAL SHELLFISH</p> <p>Seraichekas, H. R., D. A. Brashear, J. A. Barnick, P. F. Carey, and O. C. Liu (Northeast Marine Health Sciences Laboratory, Environmental Control Administration, Public Health Service, Narragansett, Rhode Island 02882) Applied Microbiology <u>16</u>, No. 12, 1865-1871 (December 1968)</p> <p>Previous studies have shown that shellfish artificially contaminated with poliovirus and coxsackievirus were cleansed by depuration treatment under controlled conditions. In these studies, each of the samples consisted of a pool of from 5 to 20 shellfish. The problem arising in the use of such sampling is that the presence of virus in undepurated animals may be obscured by the predominating number of cleansed animals, which serve as a diluent of the sample. The uncleaned shellfish that might be present would still serve as carriers of viruses. The purpose of the present study was to make a more critical evaluation of the process of depuration of shellfish, taking into consideration various aspects relevant to the future practice of commercial depuration. The authors considered the following aspects: variability of the volumes of individual shellfish samples; variability of viral accumulation in the shellfish under controlled environmental conditions; variability of viral contents in shellfish and the percentage of animals being cleansed after various intervals of depuration; and the depurability of shellfish polluted with low levels of virus. (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>Abstracter: F. T. Piskur</p>	<p>0.8 (2.149, 2.12)</p> <p>HYDRAULIC POWER ON THE SEABED</p> <p>Morgan, Robert (Marine Resources Unit, Portsmouth College of Technology, Portsmouth, England) World Fishing <u>18</u>, No. 6, 68 (June 1969)</p> <p>Probably the best way of delivering power to an undersea vehicle is by hydraulic rather than electrical means. Flexible tubes appropriately weighted and buoyed could be the means whereby a surface vessel could control and furnish power to a vehicle on the seabed. If the static pressure within the tubes were adjusted to balance the outside pressure, the tubes would have to withstand a differential pressure of only between 15 and 50 p.s.i. Moreover, by using a wind propeller, the surface vessel would have a source of free power for operating its pumps. In the Southern Ocean, where normal wind speed rarely falls below 40 knots, this method of operating would be particularly adaptable.</p> <p>Seabed tractors designed to operate hydraulically could be used for mining, fishing, and harvesting seaweed. For instance, two widely spaced unmanned tractors towing a large net could be used to catch flatfish and other types of fish that stay close to the bottom during certain seasons or times of the day. The vehicles could be so designed that the hydraulic exhaust would blow water forward onto the surface of the seabed, forcing oysters, scallops, and other bottom dwellers into catching receptacles. Or they could be equipped with cutting devices (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>Abstracter: L. Baldwin</p>







<p>2.00 (2.02)</p> <p>THE CONNECTIVE TISSUES OF FISH. II. GAPING IN COMMERCIAL SPECIES OF FROZEN FISH IN RELATION TO RIGOR MORTIS</p> <p>Love, R. M., J. Lavéty, and P. J. Steel (Ministry of Technology, Torry Research Station, Aberdeen, Scotland) Journal of Food Technology 4, No. 1, 39-44 (March 1969)</p> <p>Gaping is a phenomenon in which the sheets of connective tissue (myocommata) in fillets of fish fail to hold the blocks of muscle (myotomes) together. Love and Robertson (1968) showed that if the fish were frozen in the round before rigor mortis, thawed, and filleted, there was little or no gaping. But, if the fish were frozen in rigor mortis 1 day after being caught, the amount of gaping depended upon the biological condition of the fish--a healthy fish showed much gaping and a starved or spent fish showed little or no gaping. The purpose of the present study was to determine whether the phenomenon was general with respect to fish frozen before or after rigor mortis.</p> <p>Nine species of fish were used in the tests: catfish, haddock, cod, saithe, halibut, lemon sole, plaice, skate, and redfish. The whole fish were frozen and stored at -30° C.</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>Abstracter: F. T. Piskur</p>	<p>2.05</p> <p><u>VIBRIO PARAHAEVOLYTICUS FROM THE BLUE CRAB</u> <u>CALLINECTES SAPIDUS IN CHESAPEAKE BAY</u></p> <p>Krantz, G. E. (U.S. Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland 21654), and R. R. Colwell and E. Lovellace (Department of Biology, Georgetown University, Washington, D.C. 20007) Science 164, No. 3885, 1286-1287 (June 13, 1969)</p> <p>A series of papers has appeared over the past two decades describing the taxonomy and epidemiology of the disease-causing bacterium <i>Vibrio parahaemolyticus</i>. The first recorded isolations of the species in the United States were from seawater, sediment, and shellfish from the Puget Sound region, though shortly afterward organisms that are serologically related were isolated from estuarine sediments collected from waters off the Southeastern United States. The present authors now report finding strains of this bacterium in lethargic and moribund blue crabs (<i>Callinectes sapidus</i>) caught in the Chesapeake Bay region. Identification procedures included computer analyses in which 210 taxonomic features were used. Base compositions of the DNA (deoxyribonucleic acid) of the isolates were determined by melting temperature measurements of purified DNA, and the diagnosis was serologically confirmed by slide agglutination tests with antisera prepared against K antigens.</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>Abstracter: L. Baldwin</p>
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<p>2.1121 (2.116)</p> <p>THE COLLECTION AND APPLICATION OF TRAWL PERFORMANCE DATA</p> <p>Chaplin, P. D. (White Fish Authority, [England]) World Fishing 18, No. 6, 58-59 (June 1969)</p> <p>Early instruments used to measure the operating characteristics of trawling gear recorded their data internally. Thus the data could not be assessed until the gear to which the instruments were attached had been hauled aboard after each trial, and the instruments were of no practical use to the fisherman for monitoring the state of his gear. To solve these problems, data-taking systems were designed that would transmit data from the gear to the ship. As a rule, the systems measured some or all of the following positions and orientations: headline downward headline upward, headline forward and horizontal, headline forward and 15 degrees downward, net square downward, horizontality of the wing ends to each other, and horizontality of one side boom to the other. In addition, the speed of the net through the water was logged. Although these systems were very valuable for providing immediate design data and for assisting a skipper in planning fish-hunting tactics, the cable used to transmit the data to the ship was expensive, easily damaged, and of limited maneuverability. The need, then, was for a cheap, reliable system of obtaining information about the geometry of the gear and the conditions of the water.</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>Abstracter: L. Baldwin</p>	<p>2.113</p> <p>NOTAS SOBRE ORGANISMOS MARINHOS INCRUSTANTES E PERFURANTES DAS EMBARCACOES [NOTES ON MARINE ORGANISMS INCRUSTING AND PERFORATING SHIPS]</p> <p>Barroso Fernandes, Liana Marília, and Ayrton Fernandes da Costa (SUDENE) Boletim de Estudos de Pesca 7, No. 3, 7-26 (September-December 1967) (In Portuguese; English summary)</p> <p>Purpose.--The waters of the Port of Recife are infested with barnacles (<i>Balanus</i> sp.), marine borers (<i>Sphaeroma</i> sp.), and shipworms (<i>Teredinidae</i>). The authors decided to test the efficiency of coating products generally used to inhibit the fixation of the barnacles and the penetration of the wood-eating animals.</p> <p>Action.--Planks made of the various kinds of wood commonly used in local boat construction were coated with pitch, with a paint having a synthetic-resin base, and with a paint having a phenolic-resin-and-epoxy base. The planks were submerged in the waters of the harbor to depths ranging from 0.5 to 1.0 m. and examined, a lot at a time, at 2-month intervals.</p> <p>Findings.--Pitch reduced the penetration of teredos by 65 percent during the first 6 months; it had no effect on barnacles or marine borers. The synthetic-resin paint completely protected the wood against teredos and <i>Sphaeroma</i> for the</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>Abstracter: L. Baldwin</p>
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Teredo galleries were observed on all the planks in the following percentages: 1.00 after 60 days, 9.75 after 120 days, and 28.75 after 180 days. Barnacles were affixed to all planks, regardless of immersion time. *Sphaeroma* sp. were collected from all planks, but evidence of their action was not verified.

U.S. Patent 3,428,459  
Hinds, C. (pat.)  
Oil Center Research, Inc.  
Food Technology 23, No. 8, 48 (August 1969)

A powdered fish bait that can be reconstituted with water is prepared from locust-bean or guar gum, corn meal, wheat flour, and dehydrated insects.

[Abstractor: F. T. Piskur]

## FISH BAIT COMPOSITION

2.1121

The British White Fish Authority has now commissioned development of a commercially practical, four-channel, acoustic telemetry system. Initially the system will measure headline height, net-mouth spread, water temperature, and either trawl speed or bridle tension, as desired. Later, such measurements as the quantity of fish collecting in the cod end or escaping over the top of the net will be possible. These data are valuable to the fisherman, for they tell him when to haul the net or whether to increase towing speed so the net will rise as it meets the fish. Means may be found in the future of altering the shape of the net's mouth during a tow to correspond to the observed conformation of a fish school, or of using a given trawl for both demersal and pelagic fishing. Such environmental data as those indicating oxygen content, salinity, temperature, and direction and strength of currents may lead to new fish-searching methods.

The most significant aspect of a successful commercial telemetry system is that it will, for the first time, allow trawling companies and individual fishermen to experiment with their gear economically. Up to now, the financial consequences of wrong conclusions about design or rigging have been so severe that few organizations or individuals have been willing to experiment with other than relatively trivial changes. As a result, development of trawl gear has been very slow. To make gear-performance data readily available to the fishing industry, two series of data sheets are being prepared—one for gear technologists (covering design parameters for warps, bridles, otter boards, and nets) and the other for practicing skippers (covering when and how to adjust fishing gear to bring about desired geometrical changes during the towing operation).

[3 figures]

$$(0.7, 4.99)$$

## FATS AND ARTERIOSCLEROSIS

Strahlmann, B.  
Alimenta 7, 134 (1968)  
Food Manufacture 44, No. 4, 47 (April 1969)

The present state of scientific knowledge about arteriosclerosis and thrombosis is reviewed using papers read at a meeting of the Swiss Society of Nutritional Research (held in June 1966) as a basis. Topics discussed include the prevention of rabbit atherosclerosis with soybean meal, the role of cholesterol and its dynamics (studied by the isotopic equilibrium method), the biological evaluation of edible fats, and the relations between metabolism and intestinal flora. The desirability of a minimum content of polyenic fatty acids in the fat ration is recognized.

[Abstracter: L. Baldwin]

[Abstracter: L. Baldwin]

[2 figures, 4 references]

The catfish and skate did not gape under any of the treatments used. The remaining species gaped according to the time after death that they were frozen. Those fish frozen immediately after death gaped least; gaping increased markedly with the onset of rigor mortis. Thereafter, gaping increased as the fish were held for longer periods in ice prior to being frozen. The cause for this apparently second type of gaping is unknown. Haddock showed the most gaping. The three species of flatfish (halibut, lemon sole, and plaice) gaped less than the four roundfish (haddock, cod, saithe, redfish). Of the flatfish, the roundest bodied (halibut) gaped more than the other three of the same group. The shape of the fish, therefore, may be a factor governing the gaping of fish frozen whole in ice prior to death.

## 2.9

# NATURALLY OCCURRING TOXICANTS IN FOODS

Coom, J. M. (Jefferson Medical College, Philadelphia 19107)  
Food Technology 23, No. 8, 55-59 (August 1969)

The author discusses briefly the hazards and symptoms of consuming naturally occurring toxicants in foods. He covers toxins (such as gossypol); essential nutrients (such as vitamins A and D); sodium chloride; trace elements (minerals such as copper); proteins, fats, and carbohydrates; antivitamin (for example, thiaminase); enzyme inhibitors; goitrogens; estrogens; cyanogenetic glycosides; oxalates; spices and flavors; suspected carcinogens; and food antigens and allergens. He points out that there is no cause for alarm relative to the natural chemical components of our food. He does suggest that further efforts should be directed toward a more complete knowledge of the natural chemical constitution of foods and of the long range toxicological significance of the complex chemical makeup of our total diet.

[3 tables, 28 references]

[Abstracted: F. T. Pliskur]

[Abstract: F. T. Pliskur]

Strains of the *V. parahaemolyticus* demonstrated lipase and lecithinase activity and were able to liquify gelatin and to hydrolyze casein. The authors conclude that this capability may contribute to the invasiveness of the bacterium. They also suggest that *V. parahaemolyticus* may constitute part of the marine flora, from whence it occasionally invades marine animals and becomes a potential hazard to human health. [16 references]



Leakey, R. D., et al.  
World Fishing 18, No. 6, 52-55 (June 1969)

This block of articles gives the views of proponents and skeptics on the sea-keeping characteristics of catamarans.

The lead article explains why its author believes that of the three main hull configurations--single hull, trimaran, and catamaran--only the well-designed, power-driven catamaran cannot be rolled over by wave action. In high seas, wave action is in a circular motion on the vertical plane, the water at the foot of the wave pushing upward and that at the top breaking downward. Thus once a trimaran or a boat with a keel tilts over, the lower float and the keel act as levers to add to the rolling action. The lower hull of a catamaran, on the other hand, tends to act much as a surf board does--that is, it surfs away from the foot of the wave and pushes the upper hull back toward the horizontal. The author of this theory adds that catamarans have additional features that make them preferable as fishing vessels: they have decks like factory floors; big loads above the center of gravity are no cause for worry; icing doesn't cause them to heel; they have a large number of watertight compartments that make for safety; pitching is no worse than on a single-hull vessel, and roll, no matter at what angle the wind comes, is significantly less.

(over)

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Abstracter: L. Baldwin

Potthoff, Thomas (Tropical Atlantic Biological Laboratory, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Miami, Florida 33149)  
Commercial Fisheries Review 31, No. 7, 35-37 (July 1969) (Separate No. 844)

Purpose.--Research cruises over the past several years have produced large volumes of data from various sections of the tropical Atlantic, but biological investigations in the central tropical Atlantic--the area covered by ATEX [Atlantic Tradewind Expedition]--have been virtually nonexistent. TABL [Tropical Atlantic Biological Laboratory] therefore welcomed the opportunity for one of its biologists to be present aboard the Discoverer during the expedition. Knowledge of the presence or absence of larval, juvenile, and adult tunas in the region could be important to an understanding of the life cycle of tunas, and, conceivably, might help commercial fishermen in their quest for new fishing grounds. Collections made on ATEX of marine life other than tunas might also be valuable as indicators of the kinds of prey organisms that are available in the central Atlantic to large pelagic fishes, particularly the tunas. My objectives as an observer on the Discoverer were to collect small tunas and other organisms by dipnet under a night light, to collect larval tunas and other zooplankton by 1-meter net tows, and to observe and make records of schools of tuna and other large fishes.

Findings.--The biological observations made during the cruise in this poorly known mid-Atlantic area may be summed up as follows:

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Reprinted in part

(2.1471)

Anonymous  
World Fishing 18, No. 6, 46-47 (June 1969)

The conventional automatic pilot takes its heading reference either from a north-seeking gyro compass or a transmitting magnetic compass. The new autopilot described here takes its heading reference from the navigator system; thus the ship can be automatically steered along a Decca lane. High-speed survey vessels have used the system successfully at speeds of up to 36 knots. By adding a Decca "Seatrack" unit to the autopilot, vessels can steer precise tracks over the ground by holding any one-hundredth of a selected Decca lane. Tracking accuracies have proved to be of the order of 1 or 2 meters.

The new navigational system consists of the Seatrack unit, which is quite small, weighing about 15 lb.; the autopilot control unit; a steering gear actuating system; a rudder translator; and two power packs. The Seatrack unit contains a high precision rate gyro compass, an essential to the system, since navigator lanes, being hyperbolic rather than straight, have a constant rate of change, which the rate gyro senses. In operation, any deviation of the ship from a pre-set navigator track results in an error voltage, which is converted through the autopilot amplifier into rudder commands that keep the ship on the required one-hundredth of a lane. The Seatrack costs £850.

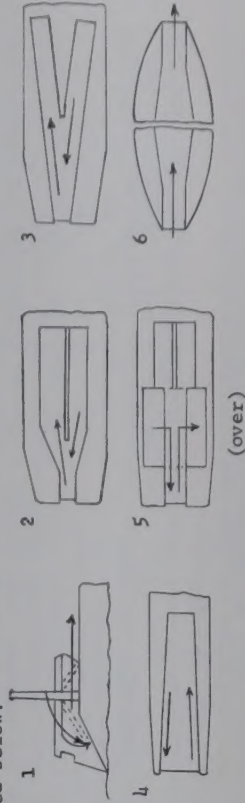
[3 figures]

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Abstracter: L. Baldwin

Anonymous  
World Fishing 18, No. 6, 56-57 (June 1969)

The efficiency of a trawling operation depends to a great extent on the relative proportion of fishing and nonfishing time. One way to reduce the proportion of nonfishing time is to use two trawls alternately--shooting one as soon as the other is hauled. East German engineers at the Wolgast Institute for Shipbuilding Technology have compared six variations of the two-trawl system and evaluated them in terms of their practicality. The six methods of hauling and shooting are illustrated below.



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Abstracter: L. Baldwin



1. Not a single school of tuna was sighted and no juvenile tuna were collected, although the chances of finding tuna appeared favorable on the basis of the temperature (25°-27° C.) and the presence of organisms suitable for tuna food.
2. Dolphin, the only large pelagic fish present in large concentrations, fed heavily on flyingfish. To my knowledge, this is the first report of concentrations of dolphin in the mid-Atlantic.

3. Study of the plankton tows made during this voyage (now in progress at TABL) has so far revealed the presence of a few skipjack tuna larvae. When all samples have finally been studied, better conclusions may be drawn as to the presence or absence of tunas in the tropical mid-Atlantic.

4. The many large concentrations of flyingfish, lanternfish, octopi, and salps observed, and the other organisms seen or collected, suggest an abundance of forage organisms suitable for tuna, marlin, and other large pelagic fishes.

[4 figures]

[Abstract: F. T. Pliskur]

Apparatus is used for beheading and filleting fish. Two descending belts converge in the vertical plane to form a clamp-conveyor. A scissor linkage and guide belts complete the apparatus.

German Patent Pend. Appl. 1,429,878  
Domenecke, A., and E. Jahn (pat.)  
Food Technology 23, No. 8, 38 (August 1969)

#### FISH PROCESSING

2.3

The seaworthiness of catamarans is not questioned by the critics. But they do not see some disadvantages that they believe are serious. Such factors as berthing space; the availability of hold space; the effect of hull loads on draft, reserve buoyance, and height of center section above the top of the waves; the size type of engine that can be accommodated and serviced in the smaller catamarans; and the violent up and down motion in larger catamarans are cited. One owner found that the cost of the vessel was not substantially higher than the cost of a conventional single-hull vessel of equivalent size, since smaller propulsion machinery provides the required speed. He also found that the bows of the twin hulls did not plow into the sea, as expected. But he did find that the ship's movements in a following sea sometimes frightened the crew and that vibration was a problem at low speeds (putting the engines too sync damped the vibration). His experience in floating ice was that ice built up between the hulls and brought the ship to a standstill.

Catamarans are economical, and therefore justified, under conditions when high speed, a large deck area, and light displacement are requisites.

[4 figures, 8 photographs]

A clamp beneath the fish on a conveying track pulls the hanging gut taut so it can be cut at the fish's throat.

[Abstract: F. T. Pliskur]

German Patent Pend. Appl. 1,429,902  
Fisadco Ltd. (pat.)  
Food Technology 23, No. 8, 38 (August 1969)

#### FISH DECUTTING

2.3

2.1471

Practicability was judged on the basis of seven characteristics. Each characteristic was allotted an "importance factor," the ideal score being 4 times the importance factor. Thus, if the importance of a characteristic were 8 and a method scored 2, its score for this characteristic would be 16. The ratings of the six methods are tabulated below.

Characteristic	Importance factor	Ideal score	Score of method					
			1	2	3	4	5	6
Operational reliability (trouble-free operation; workability in bad weather and with net sounder)	8	32	16	32	32	24	24	32
Time saving (increased fishing time and time saved in preparing gear)	8	32	24	32	32	24	12	24
Crew safety (as compared with safety of using conventional gear)	10	40	20	40	40	30	30	40
Change-over time (availability of a second net during normal fishing or when one net is damaged)	6	24	12	24	24	24	12	24
Work load (physical effort required of crew during towing and hauling)	5	20	5	15	20	15	15	15
Capital cost (in terms of extra winches and other gear)	5	20	10	15	15	15	10	5
Reserve capacity (provided by additional winches, etc., and for dealing with extra heavy cod ends)	5	20	5	20	20	18	10	18
Value rating (in percent)	-	100	49	95	97	80	60	84

[4 figures, 1 table, 6 references]

2.12

#### A STUDY TO DETERMINE THE ECONOMIC FEASIBILITY OF ESTABLISHING A COMMERCIAL HAKE FISHERY

(1.53, 9.3)

Anonymous

Prepared by Staff, Exploratory Fishing and Gear Research Base, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Seattle, Washington

A Study to Determine the Economic Feasibility of Establishing a Commercial Hake Fishery, 54 pp., Appendix (March 1969) (Sponsored by the Economic Development Administration, U.S. Department of Commerce, Washington, D.C.). Copies available from the Clearinghouse for Federal Scientific and Technical Information, 5285 Port Royal Road, Springfield, Virginia 22151. Price \$3.00 hard copy, \$0.65 microfiche.

**Purpose.**--As part of a continuing program by the Bureau of Commercial Fisheries (BCF) to assist in the development of a viable fishery on the offshore hake stocks along the Pacific Coast, a study was continued in 1967 in cooperation with the Economic Development Administration (EDA) to investigate the economic feasibility of developing a fishery on this resource. This study was carried out to provide vessel owners, fishermen, and plant operators with the information needed to determine the performance of existing trawl vessels when fishing for hake with modern midwater trawl gear. The performance of these vessels with regard to that which the processors can pay for fish will ultimately determine the success of a reduction fishery for Pacific hake.

**Presentation.**--This paper represents the final report of the EDA-financed study. The distribution of catch and effort and the gear used in the 1967 fishery are presented first. The economics of the fishery are then discussed as they pertain to the establishment of a viable fishery on Pacific hake.

[26 figures, 11 tables, 3 exhibits, 10 references]

[Reprinted in part]



### 2.9 SYMPOSIUM ON NATURAL FOOD TOXICANTS

Crosby, Donald G., et al.  
Papers presented at 156th Meeting, ACS, Atlantic City, New Jersey, September 8-13, 1968, Division of Agricultural and Food Chemistry  
Journal of Agricultural and Food Chemistry 17, No. 3, 413-538 (May-June 1969)

Of the 20 papers constituting this symposium, the following are of interest to people in fisheries:

Introduction, Donald G. Crosby (Department of Environmental Toxicology, University of California, Davis 95616), p. 413

Studies of Shellfish Poisons, Edward J. Schantz (Physical Science Division, Department of the Army, Fort Detrick, Frederick, Maryland 21701), pp. 413-416. [1 table, 31 references]

Toxins From Eggs of Fishes and Amphibia, Frederick A. Fuhrman, Geraldine J. Fuhrman, David L. Dull, and Harry S. Mosher (Max C. Fleischmann Laboratories of the Medical Sciences and Department of Chemistry, Stanford University, Stanford, California 94305), pp. 417-424. [6 figures, 4 tables, 50 references]

Use of Chlorella in Mycotoxin and Phycotoxin Research, Miyoshi Ikawa, Daniel S. Ma, Gabrielle B. Meeker, and Robert P. Davis (Department of Biochemistry, University of New Hampshire, Durham, New Hampshire 03824), pp. 425-429. [6 figures, 6 tables, 7 references] (over)

COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 9  
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Abstracter: L. Baldwin

### 3.15 PROCESS CRITERIA FOR PRODUCING RADIATION STERILIZED FISH PRODUCTS

Learson, R. J., L. J. Ronsivalli, and B. W. Spracklin (Bureau of Commercial Fisheries, Technological Laboratory, Gloucester, Massachusetts); F. Heiligman (U.S. Army Natick Laboratory, Natick, Mass.)  
Food Technology 23, No. 8, 85-91 (August 1969)

So far attempts to prepare radiosterilized fish fillets that are stable at ambient temperatures have not been successful. The combined effect of processing to inactivate enzymes and the high irradiation required for sterilization have resulted in fish fillet products with undesirable flavor and texture. The purpose of the present study was to develop a suitable technique for producing radio-sterilized products from fish fillets.

The experimental processes involved: (1) the addition of preservatives and coating materials, (2) inactivation of the enzymes, (3) packaging of the fish product, (4) cooling the packaged product to -78° C. or 0.6° C., (5) packing the packaged fish in insulated containers, and (6) radiosterilizing the packaged products. Cod, haddock, flounder, and ocean perch were tested.

The authors found that holding the products at low temperature during irradiation and using various additives (such as sodium bisulfite and butyl hydroxy anisole) reduced the adverse changes in flavor and odor induced by the irradiation (over)

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Abstracter: F. T. Piskur

### 3.15 EFFECTS OF HIGH-ENERGY RADIATION ON THE LIPIDS OF FISH (4,4)

Dubravac, M. F., and W. W. Nawar (Department of Food Science and Technology, University of Massachusetts, Amherst 01002)  
Journal of Agricultural and Food Chemistry 17, No. 3, 639-644 (May-June 1969)

No detailed information is available on the chemical compounds formed by irradiating fish or fish oil. The purpose of the present research was to obtain fundamental information on the primary effects of ionizing radiation under non-oxidative conditions on the lipid fraction of fish.

Mackerel was selected for the study because it has a high fat content, it lends itself to mild methods for extraction of the lipids, and it is readily available in a fresh condition. The lipids were extracted from the fish by pressing fillets at room temperature. The samples were irradiated with gamma rays from a Co60 source. The lipids were irradiated under vacuum at 0° C. and at 25° C., and at three irradiation doses--0.3, 2.0, and 6.0 Mrads. The volatile components formed by irradiation were studied using gas chromatography and mass spectrometry.

Fifty-six compounds were identified. These compounds included the normal alkanes C<sub>1</sub> to C<sub>17</sub>; the 1- alkenes C<sub>2</sub> to C<sub>17</sub>; the alkadienes C<sub>12</sub> to C<sub>22</sub>; the internally saturated alkenes C<sub>14</sub> to C<sub>21</sub>; the C<sub>17</sub> triene; the C<sub>11</sub> alkyne; and the

(over)

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Abstracter: F. T. Piskur

### 3.30 MAGNESIUM AND CALCIUM CONTENTS OF FISH AND SQUID TISSUES (8,8, 8,42, 7,593)

Taguchi, Takeshi, Kosaku Suzuki, and Isami Osakabe (Tokyo University of Fisheries, Konan-4, Minato-ku, Tokyo, Japan)  
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 4, 405-409 (April 1969)

The occurrence of struvite in canned seafoods is common but undesirable. As noted by Osakabe and Suzuki (1966), the major component of struvite in these foods is magnesium phosphate, though a very small amount of calcium is also present. To clarify the mechanism of struvite formation, the authors measured the magnesium and calcium content of fish and squid tissues, determined the amount of both metals that was liberated from the muscle proteins during storage, and ascertained the intracellular distribution of magnesium in the muscle. The muscle (dorsal, abdominal, and dark), heart, liver, and kidney of mackerel (*Pseudoscophorus japonicus*), jack mackerel (*Trachurus japonicus* Temminck and Schlegel), barracuda (*Sphyraena japonica* Cuvier), flatfish (*Limanda herzensteini* Jordan and Snyder), skipjack (*Katsuwonus pelamis* Linnaeus), and carp (*Cyprinus carpio* Linnaeus) and the muscle (hood, mantle, and arm) and liver of squid (*Todarodes pacificus* Steenstrup) were used.

Atomic absorption spectrophotometry revealed that the calcium content ranged from 4 to 36 mg. percent in the fish tissues and from 17 to 28 mg. percent in

(over)

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Abstracter: L. Baldwin



treatment. Products were prepared that were highly acceptable immediately after they had been irradiated. But, these same products stored at room temperature developed a marked (brown) discoloration. Heating the fish product prior to irradiation (to inactivate the enzymes) seemed to be largely responsible for the development of browning. The authors conclude that unless a solution can be found to the browning problem, the production of acceptable radiation-sterilized fish products from fillets or steaks is unlikely.



4.4 (8.8) THE RATE OF PHOSPHOLIPID HYDROLYSIS IN FROZEN FISH

Olley, June, Jane Farmer, and Eva Stephen (Ministry of Technology, Torry Research Station, Aberdeen, Scotland)  
Journal of Food Technology 4, No. 1, 27-37 (March 1969)

Love (1962) observed that insolubilization of actomyosin in salt solution, the measurement of toughness of fish as measured by the cell fragility method, and the production of free fatty acids (FFA) from phospholipids in cold stored cod all had similar activation energies. Olley and Lovern in 1960 and 1962 noted that the first two reactions appeared to go to completion at all temperatures, but that the phospholipid hydrolysis did not appear to approach the same asymptote at all temperatures. The reaction seemed to go almost to completion at temperatures just below the freezing point, but at lower temperatures the asymptote became less. The purpose of the present study was to confirm previous work showing the more rapid rate of FFA production in Gadoid species and to check the limited amount of data on change in the asymptote with temperature for the phospholipid hydrolysis.

The phospholipid hydrolysis was studied in lemon sole (*Microstomus kitt*) and haddock (*Gadus aeglefinus*) between -7° and -29° C.  
(over)

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Abstracter: F. T. Piskur

6.10 (1.93) UTILISATION OF WASTE MATERIALS IN THE FROG LEG PROCESSING INDUSTRY

Rao, D. Ramananda, and P. V. Kamasastri (Central Institute of Fisheries Technology (Unit), Bombay-5, India)  
Indian Journal of Fisheries 10, No. 1, Section B, 4-7 (April 1963)

The export of frozen frog legs from Kerala and Maharashtra has increased markedly in recent years. In 1963, over 500 metric tons of the legs, worth nearly 3,200,000 rupees (about \$670,000), was exported to the United States, France, and other European countries. However, since price trends in the international market are downward, and since about 65 percent of the total weight of the frog is waste, a way to use the waste material would help meet some of the processing expenses. With this end in view, the heads and bodies (after the hind legs were removed) were converted to oil and meal, and the chemical, storage, and nutritive characteristics of these byproducts were examined.

The yield of oil ranged from 6 to 8 percent of the total weight of the frogs, the nitrogen content ranged from 0.45 to 0.55 percent, and the unsaponifiable matter from 2.53 to 2.64 percent. Other characteristics are tabulated on the right. The oil changed very little during storage for 1 year when it was kept in sealed containers.

The yield of meal ranged from 12 to 14 percent of the total weight of the frogs. The proximate chemical composition of meals prepared by wet reduction and

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Abstracter: L. Baldwin

6.190 NUTRITIVE CONTENT OF CHILEAN ANCHOVETTA FISH MEAL EVALUATED BY CHEMICAL METHODS

Kifer, R. R., W. L. Payne, David Miller, and M. E. Ambrose (Technological Laboratory, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, College Park, Maryland)  
Feedstuffs 41, No. 31, 24-25 (August 2, 1969)

Background.--Chilean anchovetta (*Engraulis ringens*) are small fish, attaining a maximum length of about 15 cm. and a maximum weight of about 30 g. They are caught from the Humboldt Current off the coast of Peru and Chile and used by processors in both countries for making fish meal. In 1967, Chilean manufacturers produced 143,953 tons of fish meal, 40,937 tons of which was exported to the United States; in 1966, they produced 214,013 tons, exporting 89,381 tons to the United States.

Despite the fact that the meals from the two countries are manufactured from the same resource, they differ in composition. In the first place, the Peruvians lose a considerable amount of raw material because the shallowness of their harbors forces them to pump the fish an appreciable distance from the vessel to the dock. In addition, the Chilean meal contains solubles, whereas the Peruvian meal does not. Moreover, the concentration of oil in the fish cycles with the season--in December or January, it reaches a low of from 5 to 7 percent; then rises to 12 or 13 percent in May or June; it falls rapidly to about 4 percent in August or September, and attains a second peak of 9 percent in November. Then the cycle starts again.

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Abstracter: L. Baldwin

6.192 UREA COMPARISON

Anonymous  
Feedstuffs 41, No. 32, 28-29 (August 9, 1969)

Problem.--Researchers at the University of Puerto Rico, Lajas, were interested in the effect on the feed consumed and the milk produced by cows whose bage ratios had been supplemented with urea and with urea plus fish meal.

Solution.--Nine Holstein and nine Brown Swiss cows were grouped 6 days post partum, fed adjustment diets for 6 weeks, and then fed one of three complete rations for 105 days. The rations consisted basically of ground shelled corn (37.45 to 44.95 percent), ground bagasse (25 percent), and cane molasses (25 percent), with salt, bone meal, and vitamin supplements added. In addition to these ingredients, diet U2 contained 9 percent tunafish meal and 1.5 percent urea (45 percent nitrogen); diet U3, 4.75 percent tunafish meal and 2.25 urea; and U4, no fish meal and 3 percent urea. Feed was adjusted daily to permit maximum voluntary consumption. Using the corresponding data obtained during the preliminary adjustment period as independent variables, the researchers performed covariance analysis on the data obtained during the 105-day test period.

Results.--The results, as reported at the annual meeting of the American Dairy Science Association in Minneapolis, showed that the mean feed consumption and the mean productive responses declined progressively as the proportion of urea (over)

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Abstracter: L. Baldwin



Process and raw material	Chemical composition of the frog meals							
	Moisture %	Proteins %	Fat (dry basis) %	Ash %	Acid insol- ubles %	Calcium (as CaO) %	Phosphorus (as P <sub>2</sub> O <sub>5</sub> ) %	Total volatile nitrogen mg./%
Wet reduction of the entire waste	6.21	60.6	8.41	22.03	0.51	6.16	5.42	27.65
Dry reduction of the heads	7.27	56.2	12.61	18.49	2.79	4.67	3.45	23.50

Meal prepared by the dry reduction process has a higher fat content because much of the oil is removed by cooking and pressing during the wet reduction process. The press cake of the meals was dried at 80°, 110°, and 130° C., pulverized, and analyzed. The press cake that was dried at low temperature yielded a good quality meal; the fat component of the meal showed little evidence of oxidation. The values determined by fractionation of the proteins are tabulated, as are those that are associated with the nutritive value of the meals and the nature of the fat.

The percentage of proteins, fats, and minerals and the nutritive value of the frog meals are quite similar to those of fish meals; however, the  $\alpha$ -amino nitrogen content, the available lysine and gross energy values, the pepsin digestibility percentage, and the range of values for the protein quality index are lower. The saponification value of the frog oil is within the range of that for fish oils, and the acid and peroxide values of the stored frog oils are similar to those of stored sardine oils; the iodine value of the frog oil, however, is less than that of fish oils. [5 tables, 11 references]

4.4

The rate of the reaction was much faster in the haddock. The data for haddock showed evidence for a rapid first-order reaction in which lecithin and phosphatidylethanolamine containing C16:0, C18:1, and C20:5 acids were preferentially hydrolyzed. The phospholipid hydrolysis proceeded to an asymptote that decreased with lowering of temperature. Apparently the amount of free water available in the frozen state was important in the hydrolytic reactions.

[Abstract: F. T. Pliskur]

Hydrogen peroxide is used as an antioxidant in fish meal.

Arakawa, S., S. Tominga, and T. Terase (pat.)  
Food Technology 23, No. 8, 48 (August 1969)

## FISHMEAL FEEDS

4.64

U.S. Patent 3,437,489

4.64

[illegible]

Chemical Abstracts 70, No. 7, 27739e (February 17, 1969)

II.S.S.R.)

Chizhov

(3.2393)

#### 4.5 OXIDATION OF FISH LIPIDS BY OXYGEN

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to f

to fish meal increased. Intakes of over 500 grams of urea with no added fish meal significantly lowered production. Rations U2 and U3 were consumed in excess of requirements for milk production, thus the feed to milk-conversion ratios of the cows fed these diets were higher than for those fed the U4 diet. In addition, their rate of live-weight gain was appreciable. The efficiency of feed to milk-protein conversion varied little among the cows fed the three rations, although the percentage of milk protein from those fed ration U4 was lower than that of the cows fed the other diets.

In summary, cows fed diet U2 ate more ration and crude protein; gave more milk, milk protein, and milk fat and a higher percentage of milk protein; and gained more weight than did the cows fed the other two diets. Cows fed U4 had the lowest values for all these variables. But they consumed more urea and a higher percentage of crude protein (nonprotein nitrogen), and they had a higher feed-protein to milk-protein ratio than did the cows fed the other two diets. 2 tables!

heated with live steam. The fish are heated to 180° F. The cooked ground fish is then pressed into a cake. [Abstracter: F. T. Pliskur]

Food Technology 23, No. 8, 48 (August 1969)

U.S. Dept. of the Interior

Gnaedinger, R. H. (pat.)

U.S. Patent 3,429,710

## FISH CAKE FEEDSTUFF

6.59

6.190

Purpose.--Although the authors have evaluated the nutritive content of Peruvian anchovetta meal (Kifer et al., 1968), a separate evaluation of Chilean fish meal was clearly called for.

Action taken.--Sixteen samples of Chilean fish meal were collected at intervals from June 1967 to May 1968 from U.S. feed manufacturers. Half the samples were treated with either butylated hydroxy toluene or ethoxyquin, and the other half were left untreated. All the meals were analyzed chemically, and the resulting data were adjusted to provide a margin of safety equivalent to one-half standard deviation.

**Results.**--Five tables give the results of the chemical analyses of Chilean anchovetta meal:

Proximate composition and calcium and phosphorus content

### Micro mineral content

Amino-acid composition as percent of protein and as percent of fish meal

### Summary of nutrient composition data

The final table gives a mean comparison of the various nutrient contents of Peruvian and Chilean anchovetta meals. From this last table, it can be seen that the Chilean meal contains more protein, sodium, and lysine, and less extractable fat (whether treated with antioxidant or not), calcium, and phosphorus than the Peruvian meal contains. Except for the minerals just mentioned, the mineral spectra of the two meals are similar.

[6 tables, 4 references]



6.197	PHOSPHORUS SOURCES AND THEIR BIOLOGICAL VALUE IN FEEDS  Sullivan, T. W. (Department of Poultry Science, University of Nebraska, Lincoln) <i>Feedstuffs</i> <u>41</u> , No. 26, 28-29 (June 28, 1969)	6.39	LE REPEUPLEMENT DES CHAMPS DE LAMINARIA DIGITATA (L.) LAMOUROUX. INFLUENCE COMPAREE DE LA COUPE ET DE L'ARRACHAGE [REGROWTH OF BEDS OF LAMINARIA DIGITATA (L.) LAMOUROUX. COMPARATIVE EFFECT OF CUTTING AND PULLING]  Perez, R. Science et Pêche, Bull. Inst. Pêches marit., No. 181, 10 pp. (May 1969) (Institut Scientifique des Pêches Maritimes, 59, Avenue Raymond-Poincaré, Paris (16°), France) (In French)
	Phosphorus is the most expensive and perhaps the most critical inorganic nutrient needed by poultry and livestock. Because of the role of dietary phosphate in bone development, its biological value is extremely important for young animals. Until the early 1940's, the primary sources of feed phosphate were steamed bonemeal, meat scraps, fish meal, and other animal byproducts; but with the outbreak of World War II, production and distribution of feeds from these sources were restricted. Feeds composed largely of grain and soybean meal were found to be deficient in phosphorus. The feed phosphate industry then stepped into the gap.  Today dicalcium phosphate (18.5 percent P) and defluorinated phosphate (18 percent P) account for about two-thirds of the feed phosphates used. But, since reports had shown that feed phosphorus sources vary in composition (both raw materials and processing methods affect the availability of phosphorus to animals), the biological value of feed phosphates was studied in bioassays of young turkeys, and a method was derived for computing a single biological value for each phosphorus source. The formula for the computation is as follows: Phosphorus biological value = $(4\text{-week body-weight gain in grams}/10) + (4\text{-week percent bone ash}) + 10 \times (4\text{-week gain:feed ratio})$ (over)		Preface.--Is it better to harvest seaweed by cutting or by pulling? In seeking an answer to the question, the author set two goals: to compare the effect of the two methods on regrowth of a harvested area, and to analyze the amount of time required for an area harvested by each method to become exploitable again. In achieving the first goal, he periodically determined the mean dimensions (the length and diameter of the stipes and the length and width of the lamellae) of the plants that grew back following harvesting by each of the two methods, the composition of the laminaria in the two areas, and the density of growth in each of the areas; and he made general observations of conditions in each area. In achieving the second, he periodically compared the state of regrowth with the state of the laminaria in an exploitable area.  Findings.--Values obtained by measuring stipes and lamellae of 200 specimens show that the dimensions of laminaria in area A (where the plants were cut) were practically the same as those of laminaria in area B (where the plants were pulled). Histograms made during analysis of the laminaria composition of the two areas (over)
6.38 (0.4)	ANTIMICROBIAL ACTIVITY OF SOME MARINE SPONGES  Burkholder, Paul R. (Lamont Geological Observatory of Columbia University, Palisades, New York), and Klaus Ruetzler (Smithsonian Institution, Washington, D.C.) <i>Nature</i> <u>222</u> , No. 5197, 983-984 (June 7, 1969)	7.599 (9.19)	POLYCHLOROBIPHENYLS (PCB'S) AND THEIR INTERFERENCE WITH PESTICIDE RESIDUE ANALYSIS  Reynolds, Lincoln M. (Ontario Research Foundation, Sheridan Park, Ontario, Canada) <i>Bulletin of Environmental Contamination and Toxicology</i> <u>4</u> , No. 3, 128-143 (May-June 1969)
	To develop new drugs, the authors studied the antimicrobial activity of marine sponges collected from the Caribbean Sea, the Mediterranean Sea, and the Great Barrier Reef. The sponges collected from the first two areas were either freeze-dried or dehydrated by gentle heating; some from the Caribbean were used fresh when their antimicrobial activity was compared with that of fresh specimens from the Pacific. The dried sponges were ground to a powder and moistened with citrate-phosphate buffer (pH 7.0) to form a slurry. Small portions of the slurry were placed on 4-in. filter paper disks and transferred to nutrient sea-water-agar test plates seeded with marine bacteria. The plates were then incubated overnight at 32° C.  The activity of the Mediterranean sponges was tested against five microorganisms: <i>Bacillus subtilis</i> , <i>Escherichia coli</i> , <i>Candida albicans</i> , <i>Mycobacterium phlei</i> , and the marine bacterium B-746. Of the 31 species of sponges tested, 18 showed antimicrobial activity against 1 or more of the organisms. Marine 746 was the most susceptible to the sponges' growth inhibitors; <i>C. albicans</i> was the least. <i>Verrucaria aerophoba</i> , <i>Græbe crâmbe</i> , and <i>Aplysilla sulfurea</i> apparently contained (over)		Commercial Fisheries Abstracts VOL 22 NO 11 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE  Abstracter: L. Baldwin
	COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE  Abstracter: L. Baldwin		Commercial Fisheries Abstracts VOL 22 NO 11 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE  Abstracter: F. T. Fiskur



substances capable of inhibiting both gram-positive and gram-negative bacteria. *Ircinia orca* (O. Schm.), *Ircinia* (*Sarcotragus*) *spinosa* (O. Schm.), *Gallium fibulatus* (O. Schm.), *Hymedesmia versicolor* Tops., *Suberites domuncula* (Oliv.), *Cliona viridis* (O. Schm.), *Tethya aurantium* (Pallas), *Erylus discoporus* (O. Sch.), *Pa-chastrella monolifera* (O. Schm.), *Chondrilla nucula* (O. Schm.), *Leuconia solida* (O. Schm.), *Leucosolenia complicata* (Mont.), and *Clathrina blanca* (Mikl.-MacLay) were found to be nonantibiotic. Not all specimens of those species whose antimicrobial activity was weak produced zones of inhibition.

Twenty sponges collected from the shallow water around Puerto Rico were tested against 11 marine bacteria isolated from such widely different areas as Woods Hole, Massachusetts; Sapelo Island, Georgia; Puerto Rico; and the Orkney Islands. All were inhibited by extracts from 4 to 15 of the sponges, some of the bacteria being more susceptible than the others. *Verongia* spp. were among the most active of these sponges.

Fresh sponges collected from the Great Barrier Reef were compared with fresh specimens collected from the Caribbean. Although the species are different, their antimicrobial activity was quite similar, as shown in the table below.

Source of sponges	Number of samples of sponges	Sponges showing antimicrobial activity against			
		Gram-positive bacteria	Gram-negative bacteria	Candida sp.	
		Percent	Percent	Percent	Percent
Caribbean	777	35	15	10	11
Great Barrier Reef	464	39	12		

[3 tables, 3 references]

Relative phosphorus biological value = biological value of unknown source // (biological value of reference standard)  $\times 100$

The biological values for six inorganic phosphorus sources are on the right. The author suggests that typical analyses provided by the supplier or the manufacturer should be used in formulating feeds. Only those sources that consistently have biological values of 96.0 and

Phosphorus source	Value (high-low)
Curacao Island rock phosphates	90.3 - 92.2
Defluorinated phosphates	82.6 - 86.2
Dicalcium phosphates	93.5 - 102.5
Monocalcium phosphates	101.8 - 103.8
Monocalcium phosphate	97.3 - 100.7
Ammonium polyphosphate	95.2

Curacao Island rock phosphates 90.3 - 92.2  
Defluorinated phosphates 82.6 - 86.2  
Dicalcium phosphates 93.5 - 102.5  
Monocalcium phosphates 101.8 - 103.8  
Monocalcium phosphate 97.3 - 100.7  
Ammonium polyphosphate 95.2

for starting turkeys, starting chicks, and start-

ing day-old poult and chicks and of young pigs dic-

tion Carbide Corp.

British Patent 1,132,881

4.83

POLYETHER-POLYESTER ADDUCTS FOR COATING COMPOSITIONS

Boy, Kenneth L., and Paul C. Payne (patentees)

Union Carbide Corp.

4.83

POLYETHER-POLYESTER ADDUCTS FOR COATING COMPOSITIONS

Chemical Abstracts 70, No. 8, 30152p (February 26, 1969)

Boy, Kenneth L., and Paul C. Payne (patentees)

Union Carbide Corp.

4.83

POLYETHER-POLYESTER ADDUCTS FOR COATING COMPOSITIONS

repeat the reaction successfully. The nitration procedure apparently is not suitable for mixtures of pesticides and PCB's because some pesticides will not nitrate and some PCB's might nitrate.

The present author then tried separating the two groups analyzing each group separately. He tried eluting PCB's from a Florisil column with n-hexane.

The author found that, with the exception of DDE, aldrin, and heptachlor, the PCB's and pesticides can be clearly separated by the use of a Florisil column. The PCB's were almost completely removed by elution with 200 ml. of hexane. DDE is eluted with the PCB's by hexane. This phenomenon can be used to advantage because the estimation of small amounts of DDT in the presence of interfering materials such as a PCB is enhanced if DDE is previously removed. The amount of DDT originally present can be estimated from the DDE produced by dehydrochlorination.

As a result of this study and in view of the fact that the presence of PCB's in wildlife tissues has not been positively confirmed by techniques other than chromatography, some of the peaks in earlier analyses may have been due to condensation products of the metabolites of pesticides such as DDT. The author suggests that more emphasis should be given to chemical modification of the pesticides and reinjection of the modified products into the gas chromatograph using retention times of the products as means of confirmation.

[2 figures, 2 tables, 11 references]

were superimposable, and curves of monthly density were likewise equivalent. General observations revealed that, although cutting does not destroy as many of the little plants as pulling does, it leaves stumps and crampons that rot and tend to hinder, possibly by the toxic substances that are exuded, for as long as 6 months the fixation, germination, and development of the young plants in the immediate vicinity. Although pulling removes many small laminaria, it also tears off sections of Lithothamnium, which covers many of the rocks upon which the laminaria need to grow; thus openings are made to the rocks, permitting the laminaria to fasten on a stable foundation and withstand the action of the waves better than they could if they were attached to the fragile Lithothamnium skin.

Reconstitution of harvested laminaria beds takes a relatively long time, from 18 to 20 months. Cutting as it is now practiced offers no particular advantage compared with pulling--the two experimental areas recovered in the same fashion and at the same speed.

[5 figures, 2 tables]

[Abstract: L. Baldwin]

The role of glucono-delta-lactone as a fermentation product of the glucose that occurs naturally in dry sausage, as an added flavoring, and as a digestible carbohydrate is examined in the light of food regulations. A comprehensive review of the literature is contained.

Kotter, L., A. Palitzsch, and G. Geiger

Fleischwirtschaft 48, 1333 (1968)

Food Manufacture 44, No. 4, 46 (April 1969)

6.54

GLUCONO-DELTA-LACTONE IN SAUSAGES



7.89  
(2.05, 6.199)

SCREENING OF FEED COMPONENTS FOR SALMONELLA  
WITH POLYVALENT H AGGLUTINATION

Barkate, John A. (Central Research Laboratories, Ralston Purina Company, St. Louis, Missouri 63199)  
Applied Microbiology 16, No. 12, 1872-1874 (December 1968)

The presence of salmonellae in feeds is frequently associated with the use of contaminated animal protein supplements. Current methods for detection and identification of Salmonellae organisms are cumbersome and lengthy--the conventional methods require 4 days. More rapid reliable methods are needed because analytical results are required before feed ingredients are distributed or used. The purpose of this study was to evaluate the application of the rapid screening method for the detection of Salmonellae organisms with polyvalent H antisera to feed components.

The samples tested came from a variety of sources and were selected to include variations in raw materials processed, methods of processing, levels of sanitation, and types of products. A total of 1,894 samples were tested with the polyvalent H method and the conventional method.

Salmonellae organisms were detected in 1,134 samples with the polyvalent H method and in 1,141 samples with the conventional method. Statistical analyses revealed that the polyvalent H method is as reliable as the conventional method. Salmonellae can be detected by the polyvalent H method in 60 hr. The author

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 15  
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Abstracter: F. T. Piskur

9.13  
(1.120)

ON BODY TEMPERATURES OF TUNAS AT THE TIME OF HAULAGE

Konagaya, Shiro (Tokai Reg. Fish. Res. Lab., Chuo-ku, Tokyo, Japan), Kazuoki Yamabe (Department of Fisheries, Nihon University, Tokyo, Japan), and Keishi Amano (Tokai Reg. Fish. Res. Lab.)  
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 4, 410-416 (April 1969)

Although numerous reports have stated that the body temperature of fishes is approximately the same as the temperature of the environment, other reports have shown that the temperature of tuna is higher by as much as 14° C. than that of the water. Carey and Teal reported in 1966 that the temperature of yellow fin (Thunnus albacores) and big-eye tuna (T. obesus) is highest in the lateral muscle behind the pectoral fin, where the fish is thickest. They objected to the suggestion made by Zharov (1965) that the high temperature is caused by the violent struggles of the fish after they are hooked. The present authors investigated the body temperatures of albacore (T. alalunga), yellow fin, big-eye, and southern blue-fin (T. maccoyii) in an effort to clarify the contradictions. Besides the physiological significance of a higher body temperature, there is the technological significance--the high temperature of the flesh would increase the rate of chemical reaction or enzymatic activity and, as a result, decrease the freshness of the flesh before it could be refrigerated.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 15  
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Abstracter: L. Baldwin

9.13  
(1.85)

criação do sururu Mytella falcata (Orbigny, 1846)  
em laboratório  
[RAISING MUSSELS MYTELLA FALCATA (ORBIGNY, 1846)  
IN THE LABORATORY]

Pereira-Barros, J. Bento (SUDENE), and Sílvio J. Macêdo (IOUFP)  
Boletim de Estudos de Pesca 1, No. 2, 31-42 (May-August 1967) (In Portuguese; English summary)

Problem.--The yield of mussel (Mytella falcata Orbigny) from the Mundaú lagoon fluctuates as the volume of water entering the lagoon through the Mundaú River fluctuates. When the winter is fair, there is practically no off season in the fishery. But when floods are intense and the salinity of the water decreases, the mortality rate of the mussels rises sharply, and production declines by as much as 44 percent.

Solution.--As the first step toward finding possible means of controlling ecological conditions in the lagoon, the authors determined the maximum, minimum, and optimum levels of salinity that the mussels could tolerate. Using laboratory aquaria, they attempted to raise groups of mussels in waters whose salinity ranged in 1% increments from 0 to 36‰. The mussels tested were of several length classes; the temperature and oxygen content of the water were maintained at levels ranging from 23.7° to 28.0° C. and from 4 to 5 ml./l., respectively, depending on the natural environment calculated at the end of 7 days.

(over)

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Abstracter: L. Baldwin

9.13

MICROVOLT ELECTRIC SIGNALS FROM FISHES AND THE ENVIRONMENT

Barham, E. G., W. B. Huckabay, and R. Gowdy (Marine Environment Division, Naval Undersea Research and Development Center, San Diego, California 92132), and B. Burns  
Science 164, No. 3882, 965-968 (May 23, 1969)

Members of nine fish families are known to generate strong electric pulses (ranging from 4 to 550 volts) for stunning prey, for defense, and possibly for communication. Other aquatic animals--for example, reptiles and brine shrimp--apparently produce none. In between these forms are fishes that produce weak signals. Minto and Hudson (1967) listed 130 of these fishes, belonging to 58 families. They reported that they had picked up species-specific signals with dipole antenna in aquarium tanks and even occasionally in the fishes' natural environment at a distance of several hundred meters.

Using equipment similar to that used by Minto and Hudson, the present authors recorded signals in the 0.01 to 40 μv. range from separate tanks containing albino channel catfish (Ictalurus punctatus), black crappie (Pomoxis nigromaculatus), and red-breast sunfish (Lepomis auritus), southern stingray (Dasyatis americana), and an amphibian (Siren lacertina). The signals were probably generated by the potentials from white-fiber-muscle action, since they correlated with the animals' rapid swimming movements or with their fright tremors. Sharp, spontaneous, pop-like signals having from two to three spikes were recorded from a tank containing

(over)

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Abstracter: L. Baldwin



9.13

Tilapia mossambica. The pops increased from 67 per minute at 6:30 p.m. to 200 per minute at 9 p.m. to 2,000 per minute by midnight, even though the tilapia's overt activity did not appear to change during this period.

Other experiments were run on tilapia, catfish, and northern anchovy (Engraulis mordax) in a reservoir, in live wells open to the bay, and in a lake. Click- and ricochet-type signals were recorded in all these aquatic environments (and in a backyard swimming pool). The ricochet-type signals increased markedly after sundown. On the basis of these results, the authors conclude that the click- and ricochet-type signals are not biologically generated but are inherent in bodies of water--they come from earth currents, the atmosphere, the stratosphere, and outer space. Such signals are known to change with the time of day, the latitude, the inclination of the sun, the sun's activity, and various other factors. Apparently their characteristics when received in water with a dipole antenna are so altered that even people familiar with atmospheric signals do not recognize them. Moreover, since they are similar in form and intensity to fish-generated signals, the two could be easily confused. These conclusions do not rule out the possibility of receiving, in natural environments, weak electric signals produced by fish, particularly signals from short ranges under optimum conditions.

The experiments conducted here demonstrate that some "nonelectric" fishes, and at least one amphibian, produce receivable electric signals. What role these signals play in the fishes' lives remains unanswered. Nevertheless, reception of the signals would seem to offer a valuable and as yet little-used tool in experiments on fish behavior, though practical applications in electromagnetically noisy natural environments may be unproductive. [2 figures, 25 references]

6.11

Salinity of water	Mussel mortality
0	15
1	17
2	20
3	20
4	0.0
5	0.5
6	0.9
7	0.9
8	0.9
9	0.9
10	0.9
11	0.9
12	0.9
13	0.9
14	0.9
15	0.9
16	0.9
17	0.9
18	0.9
19	0.9
20	0.9
21	0.9
22	0.9
23	0.9
24	0.9
25	0.9

Results.--The table on the left shows the main results. Conclusions.--From these results, the authors conclude that mussels can live in waters whose salinity ranges from 2% to 35%. Since the rate of mortality in waters having a salinity of from 2% to 4% and from 16% to 35% was highest during the first few days, they also conclude that mussels are able to adapt, to a given extent, to changes in salinity. The optimum salinity was considered to range from 5% to 15% and above 5% and above 15% there was some mortality during the first few days of each experiment. [2 figures, 2 tables, 8 references]

9.13

Using a thermometer mounted in stainless steel tubing, they measured the temperature of the tuna at points immediately beneath the skin and near the vertebra at the middle of the dorsal fin. Measurements were made within 2 min. of the fish's being hauled on board. The relation between the condition of the fish--that is, whether it was fully alive and struggling, weak, dead but in rigor, or in rigor mortis--and the body temperature was recorded. The internal temperature of the live tunas was from 9.5° to 16° C. above the temperature of the water at the depth they were caught; the temperature of the dead fish was from 2° to 7° C. higher than that of the water. The temperature of the weak fish was generally lower than that of the fully live fish. The temperature of large, dead yellow-fin was slightly higher than that of small, dead albacore; the implication is that the rate of heat loss to the water is a significant factor.

The relation between body temperature and the temperature of the tunas' environment upon capture was calculated. The authors assumed that if tuna have a body temperature under normal conditions, then the high temperatures measured would not be due to struggling. Thus the measured values should be relatively constant. The data taken during the present experiment as well as those taken by several other workers have shown that the temperatures vary widely. The authors suggest that even though tuna may normally have body temperatures somewhat higher than the temperature of their environment, the problem of their actual body temperature remains unsolved. [5 figures, 1 table, 7 references]

6.8

notes that the polyvalent H method detects only the presence (or absence) of specific flagellar antisera. [2 figures, 10 references]

A modified coagulation test was used in experiments on hake (a lean fish) and mackerel and pilchard (oily fishes). In the temperature range of from 60° to 100° C., the maximum temperature ( $T_m$ ) of a heat treatment could be calculated by use of the equation  $T_m = 1.02(T_c - 0.2) + 2.0$ .  $T_c$  = The coagulation temperature of the proteins of the filtrate obtained after extraction of the heated homogenate. For the oily fish, the equation  $T_m = (T_c + 0.1) + 2.6$  could be used to calculate the maximum temperature in the range 60° to 80° C.;  $T_m = 1.47(T_c - 37.0) + 3.9$  in the range from 80° to 100° C. [1 figure, 3 tables, 19 references] [Abstract: F. T. Pliskur]

The purpose of the study was to develop a test to determine the degree of heating of fish in cookers used for manufacturing fish meal. The heating temperature range was 60° to 100° C.

7.89  
(6.132)  
DETERMINATION OF DEGREE OF HEATING OF FISH MUSCLE  
Doesburg, J. J., and Deirdre Papendorf (Fishing Industry Research Institute, University of Cape Town, Rondebosch, South Africa)  
Journal of Food Technology 4, No. 1, 17-26 (March 1969)

8.59  
MORPHOCHEMICAL ANALYSIS OF MUCOUS CELLS  
IN THE SKIN AND SLIME GLANDS OF HAGFISHES  
Leppi, T. John (Sch. of Med., Univ. of New Mexico, Albuquerque)  
Chemical Abstracts 70, No. 9, 35410f (March 3, 1969)



9.15  
(1.0112)

DESTRUCTION OF PACIFIC CORALS BY THE SEA STAR ACANTHASTER PLanci

Chesher, Richard H. (University of Guam, Agaña, Guam)  
Science 165, No. 3890, 280-283 (July 18, 1969)

Problem.--The "crown-of-thorns starfish" (Acanthaster planci, Linnaeus) has been implicated in the destruction of large tracts of living coral off Borneo, New Guinea, the Fiji Islands, Truk, Palau, Yap, Rota, Sipan, Wake, Johnston Island, Midway, the east coast of Malaysia, Australia, and Guam. When the coral polyps are killed by the predacious starfish, the corallum is rapidly overgrown with algae, and most fish leave the area. Thus the destruction of the living coral reefs bodes economic disaster for the islands and atolls of Oceania, for most of the inhabitants derive a great part of their protein from reef fisheries. Moreover, loss of the living coral will lead to severe erosion of land that is normally protected from storm waves by a buffering line of reefs. The immediate problem, then, is to try to find the cause of the recent population explosion of A. planci and to devise some means of controlling it.

Action taken.--The severe infestation of the reefs off the U.S. Territory of Guam has led to establishment of a control program under the direction of the University of Guam. The first step has been collection of data on feeding rates, population movements, and stages of infestation along the coral reefs of Guam and Palau. These data include observations of the presence or absence of the starfish's natural enemies and of alterations in the natural environment caused by man-made disruptions.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Abstracter: L. Baldwin

9.19

RESIDUES IN FISH, WILDLIFE, AND ESTUARIES.  
CHLORINATED HYDROCARBON PESTICIDES  
IN CALIFORNIA BAYS AND ESTUARIES

Modin, John C. (California Department of Fish and Game, Marine Resources Operations, Menlo Park, California 94025)  
Pesticides Monitoring Journal 3, No. 1, 1-7 (June 1969) (Pesticides Program, Food and Drug Administration, 1600 Clifton Road, N.E., Atlanta, Georgia 30333)

Program.--As part of a nationwide program to monitor organochlorine pesticide residues in estuaries, the U.S. Bureau of Commercial Fisheries in January 1966 contracted to the California Department of Fish and Game the responsibility to monitor selected estuaries in California for pesticides.

Findings.--Analyses of oysters, mussels, and clams sampled at points of interest within each estuary revealed DDT, DDD, DDE, dieldrin, and endrin in concentrations from 10 to 3,600 p.p.b. Calculations are based on the laboratory wet weight of homogenized tissue. In studies of offshore exposure, high levels of DDT, DDD, and DDE were found in a king crab (2,739 p.p.b.) and in ova from a king salmon (668 p.p.b.). Pesticides were also measured in the ova of prawn, flounder, halibut, and sole; of these, halibut ova were the most highly contaminated, with DDE, DDD, and DDT measuring 591 p.p.b.

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Reprinted in part

9.19

PESTICIDES IN WATER.  
PESTICIDE RESIDUES IN SEDIMENTS OF THE LOWER MISSISSIPPI RIVER  
AND ITS TRIBUTARIES

Barthel, W. F. (Food and Drug Administration, Public Health Service, Department of Health, Education, and Welfare, Atlanta, Georgia 30333), J. C. Hawthorne, J. H. Ford (Plant Pest Control Division, U.S. Department of Agriculture, Gulfport, Miss. 39501), G. C. Bolton, L. L. McDowell, E. H. Grissinger, and D. A. Parsons (Sedimentation Laboratory, Soil and Water Conservation Research Division, U.S. Department of Agriculture, Oxford, Miss. 38655)  
Pesticides Monitoring Journal 3, No. 1, 8-66 (June 1969)

Purpose.--Studies of the chlorinated hydrocarbon content of sediments and water from the lower Mississippi River and its tributaries were conducted in 1964, 1966, and 1967 to determine the extent and possible sources of agricultural pesticides in the streams of the Delta.

Action.--The Mississippi River bed was sampled at 11 sites located between Tiptonville, Tenn., and New Orleans, La. Tributaries of the Mississippi in the Delta were sampled in Tennessee, Mississippi, Louisiana, and Arkansas.

Findings.--Pesticides residues were detected from both agricultural and non-agricultural sources; however, no evidence was found of a general buildup of chlorinated hydrocarbons in the sediments of these streams from farm use. Dieldrin, (over)

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Authors' abstract

9.19

SEWAGE TREATMENT: COMPLETE PROCESS

Anonymous

Chemical and Engineering News 47, No. 30, 8 (July 21, 1969)

Problem.--Two methods of treating municipal sewage are now used: a biological method and a recycling method. However, the first leaves sludge that nourishes algae in the rivers and lakes into which effluent is channelled, and the second is expensive.

Solution.--Matthew M. Zuckerman and Alan H. Molof, engineers at New York University, have proposed an economical, all-chemical process for treating sewage. The basic concept is rooted in their discovery that soluble organic materials in waste water fall into two distinct categories--those having a molecular weight of 1,200 or more (slightly more than half the materials are of this class) and those having a molecular weight of 400 or less (the rest fall here). The process involves converting the higher weight materials to the lower weight group and then removing all the organic materials, as well as the phosphorus and the nitrogen, by adsorption. It provides the full treatment now provided by primary (usually sedimentation), secondary (biological), and tertiary (for example, activated carbon) systems.

The Zuckerman-Molof process operates as follows: (1) Raw sewage, with 65 p.p.m. dissolved organic solids, goes through alkaline hydrolysis. This reaction (over)

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<p>9.4 MARINE SCIENCE AFFAIRS--A YEAR OF BROADENED PARTICIPATION. THE THIRD REPORT OF THE PRESIDENT TO THE CONGRESS ON MARINE RESOURCES AND ENGINEERING DEVELOPMENT</p> <p>Anonymous Marine Science Affairs--A Year of Broadened Participation, 251 pp. (January 1969) For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price \$1.25</p> <p>Table of Contents</p> <p>INTRODUCTION</p> <p>I. MARINE SCIENCES AND NATIONAL GOALS (opportunities, Federal response to the oceans' challenge, Federal marine-science budget for Fiscal Year 1970)</p> <p>II. A PERSPECTIVE FOR MARINE SCIENCE AFFAIRS (the oceans as a means of transportation, employment, security, a source of protein, fuels, minerals; an arena for international endeavor)</p> <p>III. EXPANDING INTERNATIONAL COOPERATION AND UNDERSTANDING (developing legal bases for international and regional control, improving cooperative arrangements)</p> <p>IV. ENHANCING BENEFITS FROM THE COASTAL ZONE (an interagency approach to conservation, recreation, water quality, planned usage of the coastal zones and the Great Lakes)</p> <p>V. STRENGTHENING MILITARY PROGRAMS FOR NATIONAL SECURITY (scope, budget, technology, and activities of Federal and civilian agencies in terms of defense) (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE Abstracter: L. Baldwin</p>	<p>9.6 JOURNAL OF TEXTURE STUDIES</p> <p>(0.6) Anonymous Journal of Texture Studies brochure, 4 pp. (n.d.) (D. Reidel Publishing Company, P.O. Box 17, Dordrecht, Holland)</p> <p>The textural attributes of foods and pharmaceuticals have a direct bearing on their appeal to the consumer. Until not so very long ago empirical tests were mainly used to assess these attributes, and such tests were adequate for quality control purposes. However, in recent years consumer requirements have become more sophisticated thus necessitating more detailed and meaningful investigations of textural attributes and the factors which influence them. Such investigations involve many disciplines e.g. food science and technology, pharmaceutical chemistry, psychophysics, mechanics of mastication, etc.</p> <p>The aim and purpose of this journal is to publish original work from all those disciplines which have some relevance to the texture and consistency of foods, pharmaceuticals, and allied products. For the first time the reader will be presented with current textural studies within the pages of a single journal.</p> <p>Subjects covered will be instrumental and other methods of measurement, sensory assessment by specialized panels and consumer panels, psychology of sensory assessment, panel training and scoring procedures, correlation of instrumental and sensory assessments, and discussions on the shearing forces operative during product usage by the consumer.</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE Reprinted in part</p>
<p>9.6 SOME RECENT PUBLICATIONS</p> <p>Anonymous FAO Fish Culture Bulletin 1, No. 3, 24-25 (April 1969) (Fishery Resources and Exploitation Division, Department of Fisheries, Food and Agriculture Organization of the United Nations, Rome, Italy)</p> <p>The publications cited, and in some instances briefly described, here deal with (1) fish culture in general, (2) the farming of specific kinds of fish, and (3) the farming of crustaceans and mollusks. [The bracketed number preceding a publication is the CFA cross reference.]</p> <p>(1) General Fish Culture [9.16] "The Farming of Fish," by C. F. Hickling. Pergamon Press Ltd., Headington Hill Hall, Oxford, 4-5 Fitzroy Square, London, W.1., England. vii + 88 pp. (1968) Price 21s.</p> <p>[9.19] "A Preliminary Bibliography on the Utilization of Sewage in Fish Culture," by George H. Allen. FAO Fisheries Circular No. 308. 15 pp. (1969) "Some Basic Concepts on Fish Culture," by G. A. Prowse. IPFC Occasional Paper 69/2. 12 pp. (1969) "The Role of FAO in the Development of Inland Fishery Resources," by Department of Fisheries. FAO Fisheries Technical Paper No. 81. 6 pp. (1968) (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE Abstracter: L. Baldwin</p>	<p>9.6 PHYCOLOGY</p> <p>(6.30) Jackson, Daniel F. (ed.) Algae, Man, and the Environment (Proceedings of an International Symposium, Syracuse, N.Y., 1967. x + 554 pp., illus. Syracuse University Press: Syracuse, New York [1968]). Price \$18. Reviewed by Robert W. Krauss (Department of Botany, University of Maryland, College Park) Science 164, No. 3881, 817-818 (May 16, 1969)</p> <p>The book serves to bring to the reader's attention the concern that is being increasingly manifested by both individuals and governments about algal micro-organisms. Although most specialists would severely criticize the lack of cohesiveness in the selection of topics and the organization of a symposium that focused so little on any one segment of the subject, says the reviewer, the general reader will find a selection of papers dealing with a broad range of intriguing topics. In this potpourri, as he calls it, are papers providing an overview of both research (applied as well as strictly basic) and researchers, a collection of electron photomicrographs in which dissection of the ultrastructure of blue-green algae is depicted, a summary of a fair portion of the literature on the medical problems associated with algae, an explanation of the taxonomic philosophy of algal nomenclature, and a report of studies dealing with the engineering of sewage treatment (in which algae are scarcely mentioned at all).</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE Abstracter: L. Baldwin</p>



9.6

In addition to original research contributions we intend to publish review papers, letters to the editor, research notes, abstracts, and book reviews. All submitted manuscripts will be assured of speedy publication subject to the approval of the nominated referees. No page charges will be levied on the contributors or their institutions. Each author will receive 25 reprints free. Additional reprints may be purchased. It is hoped that this journal will become the central forum for all matters relating to texture and consistency.

The first issue is scheduled for publication Fall 1961.

Subscription price per volume of 4 issues (ca. 500 pages) Dfl. 191.-- (US\$45.--). The cost of postage is not included. Initially the journal will be published quarterly. Private persons (not institutes, laboratories, libraries, etc.) may subscribe at the reduced rate of Dfl. 50.-- (US\$12.--) (per volume). The cost of postage is not included. They should declare that the subscription is for their own personal use, that it will not replace any existing library subscription and will not be put at the disposal of any library.

Subscriptions should be sent to D. Reidel Publishing Company, P.O. Box 17, Dordrecht, Holland, or to any subscription agent.

9.6

#### 9.6 (9.16) THE BIOLOGICAL BASIS FOR FRESHWATER FISH PRODUCTION

Gerking, Shelby D. (ed.) The Biological Basis for Freshwater Fish Production, 495 pp. (Wiley: New York (1967))

Chemical Abstracts 70, No. 9, 35503p (March 3, 1969)

9.6

- VI. ACCELERATING USE OF FOOD FROM THE SEA (status of U.S. fishing industry, revitalizing the industry; food from the sea to combat hunger)
- VII. ENCOURAGING DEVELOPMENT OF NON-LIVING RESOURCES (Federal, state, and private development of off-shore mineral resources)
- VIII. FACILITATING TRANSPORT AND TRADE (improving the merchant fleet, ship channels, harbors, ports, navigation aids; reducing pollution)
- IX. LAUNCHING AN INTERNATIONAL DECADE OF OCEAN EXPLORATION (goals and types of program, both national and international, required)
- X. ADVANCING THE SEA GRANT PROGRAM (policies and guidelines for implementing the National Sea Grant College and Program Act, status of the program)
- XI. FORMULATING ARCTIC POLICIES AND PROGRAMS (developing a policy, expanding research capabilities, stating the scientific goals of an Arctic program)
- XII. UNDERSTANDING AND SURVEYING THE OCEAN ENVIRONMENT (mapping, charting, geodesy, ocean observation and prediction, buoy technology, spacecraft oceanography)
- XIII. INFORMATION MANAGEMENT (collecting, processing, and distributing marine environmental data; analyzing user needs and means of supplying them)
- XIV. RESEARCH, MANPOWER, AND ENGINEERING (recent advances in marine engineering and technology; manpower training and education; Federal research funding)
- XV. NATIONAL POLICY PLANNING AND COORDINATION (the function of the National Council on Marine Resources and Engineering Development in developing a national effort, communicating with non-Federal agencies, and serving as a national advocate for marine sciences)
- XVI. LOOKING AHEAD (what we must do to take advantage of existing opportunities) [44 figures, 29 tables, 3 appendices]

The reviewer concludes by stating that phycologists will need the book because it provides an introduction to the literature of certain aspects of phycology not normally available to the specialist; it places phycology on a global stage, thereby helping the investigator orient himself. However, the reviewer adds, the nonspecialist who expects to learn very much about algae, man, or the environment will surely be confused.

[Abstracter: L. Baldwin]

The first volume of this facsimile reprint, first published in 1820, is a pioneer work on oceanography that, because of its precision, detail, and scope, should be of interest to biologists, oceanographers, geographers, glaciologists, meteorologists, students of navigation, naval architects, economists, and social and legal historians. The second volume, according to the reviewer, is a classic of the whaling life. Sir Alister Hardy has written an introduction to the reprint giving an account of the life and achievements of the sailor-explorer-scientist-theologian author.

Reviewed by Robert Clarke

January 1, 1970)

Newton Abbot, Devon, England [March 1969] Price 160s (126s if bought before

Scoreby, William, Jr. An Account of the Arctic Regions With a History and Description of the Northern Whale-Fishery Vol. 1: The Arctic, xx + 551 pp. + 82 appendix pp.; Vol. 2: The Whale-Fishery, viii + 574 pp. + 22 of plates. (David and Charles Reprints: Newton Abbot, Devon, England [March 1969])

(1.953)

#### EXPLORER EXTRAORDINARY

- [9.17] "Scientific Basis for the Conservation of Non-oceanic Living Aquatic Resources," by William A. Dill and T. V. R. Pillay. FAO Fisheries Technical Paper No. 82. 15 pp. (1968).
- [1.015] "Report to the Government of the Syrian Arab Republic on Fish Culture Project and Related Fields," based on work of D. R. Riedel. FAO Fish. UNDP(TA) Rep. No. 2445. 36 pp. (n.d.)
- [1.016] "Report to the Government of Uganda on Fish Culture Development," based on work of K. M. Apostolski. FAO/UNDP(TA) Report No. 2575.vi + 11 pp. (2) Farming Specific Fish
- [1.92], "Synopsis of Biological Data on Catla, Catla catla (Hamilton, 1822)," by V. G. Jhingran. FAO Fisheries Synopsis No. 32, Rev. 1, var. pp. (1968)
- [1.92], "An Annotated Bibliography of Tilapia (Pisces, Cichlidae)," by D. F. E. Thys van den Audenaerde. Tervuren, Belgique, Musée royal de l'Afrique centrale. Documentation Zoologique, No. 14. 406 pp. (1968)
- [1.92] "A Preliminary Bibliography of the Grass Carp, *Ctenopharyngodon idella* Valenciennes," by K. K. Nair. FAO Fisheries Circular No. 302. 15 pp. (1968)
- [1.85] (3) Farming Crustaceans and Mollusks
- [1.85] "A Brief Working Bibliography on Shrimp Culture With Particular Reference to *Macrobrachium* spp.," by S. W. Ling, compiler. IPFC Occasional Paper 68/1. 4 pp. (1968)
- [1.88] "Mollusc Culture: A Review of Mussel Production by Raft Culture," by E. Edwards. Dublin, Irish Sea Fisheries Board. 7 pp. (1968)
- [1.85] "Proceedings of the World Scientific Conference on the Biology and Culture of Shrimps and Prawns, Mexico City, Mexico, 12-21 June 1967," FAO Fisheries Reports (57), Vol. 1, 75 pp.; Vol. 2, 111 + 587 pp. (n.d.)



<p>0.32      ESR STUDIES OF COPPER(II) COMPLEX IONS</p> <p>Crawford, Thomas H., and Jerry O. Dalton (Department of Chemistry, University of Louisville, Louisville, Kentucky 40208) Archives of Biochemistry and Biophysics <u>131</u>, No. 1, 123-138 (April 1969)</p> <p>A number of different techniques are currently being used to study the interaction of copper(II) ions with various amino acids, peptides, and proteins. In the present study, the authors report the changes in a bonding parameter, <math>a^2</math>, for several copper(II)-peptide complexes as determined by ESR (electron spin resonance) measurements over a limited range of pH. The bonding parameter <math>a^2</math> was evaluated at liquid-nitrogen temperatures. The changes in the nature of the metal to ligand bonding are reflected in the changing values of <math>a^2</math> as the pH is varied.</p> <p>The authors found a reasonable correlation between the structures proposed in the literature as determined by spectrophotometric and potentiometric methods and the values of <math>a^2</math> as determined by ESR measurements. They particularly note the apparent change in the nature of the bonding in the trypsin-copper(II) complex over the range of pH 5 to pH 6, suggesting that primarily amine-amide oxygen bonding sites are rearranged to amine-amide nitrogen-bonding sites. They further note no detectable change in ESR parameters on exposure of trypsin-copper(II) samples to magnetic fields of approximately 14,100 G. [6 figures, 1 table, 36 references] [Abstracter: F. T. Piskur]</p> <p>COMMERCIAL FISHERIES ABSTRACTS    VOL 22    NO 11    PAGE    21 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p>	<p>0.36      DDT UPTAKE AND METABOLISM BY A MARINE DIATOM (9.13)</p> <p>Keil, Julian E. (Preventive Medicine Section, Medical College of South Carolina, Charleston, South Carolina), and Lamar E. Priester (Chemistry Department, Medical College of South Carolina, Charleston) Bulletin of Environmental Contamination and Toxicology <u>4</u>, No. 3, 169-173 (May-June 1969)</p> <p>Keil (1965) found that shrimp in aquaria were sensitive to small amounts of certain insecticides, but shrimp in a natural environment were not affected when similar levels of insecticide were applied to that environment. This reaction indicated the possible presence of "detoxifiers" in the environment. Microorganisms in the water might serve as detoxifiers, since they (especially the diatoms) store food as oil and leucosin rather than starch and might "pick up" the oil soluble pesticides.</p> <p>The authors found that the diatom <i>Cylindrotheca closterium</i>, Reimann and Lewin, was capable of absorbing and concentrating DDT above the level of the DDT in sea water. The DDT was metabolized by the organism only to DDE. [1 table, 4 references] [Abstracter: F. T. Piskur]</p> <p>COMMERCIAL FISHERIES ABSTRACTS    VOL 22    NO 11    PAGE    21 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p>
<p>0.35      THE MECHANISM OF MUSCULAR CONTRACTION</p> <p>Huxley, H. E. (Medical Research Council Laboratory of Molecular Biology, Hills Road, Cambridge, England) Science <u>164</u>, No. 3886, 1356-1366 (June 20, 1969)</p> <p>The article discusses new findings about the contraction process in striated muscle and the implications of these findings.</p> <p>Striated muscle contracts by means of some mechanism that generates a relative sliding force between the partly overlapping arrays of actin and myosin filaments. Seemingly, the cross-bridges that project from the myosin filaments and carry the adenosine triphosphatase and actin binding sites are involved in generating the sliding force. The actual force-generating structure is attached to the "backbone" of the myosin filaments by a linkage 400 Å long and having flexible couplings at each end. This structure, then, can attach itself to the actin filament in a constant configuration and undergo structural changes and produce longitudinal forces that are exactly the same over a wide range of interfilament separations. Since the muscle structure is so arranged that the linkage is under tension rather than compression when a contractile force is being generated, the force can be transmitted without difficulty. The characteristic feature of the contraction mechanism may be a rigid attachment of the globular "head" of the myosin molecule to the actin filament and an active change in the angle of attachment during the splitting of adenosine triphosphate. [12 figures, 75 references] [Abstracter: L. Baldwin]</p> <p>COMMERCIAL FISHERIES ABSTRACTS    VOL 22    NO 11    PAGE    21 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p>	<p>1.0145      OCEANOLOGII (9.4)</p> <p>Plunkett, Robert D. Oceans <u>2</u>, No. 1, 48-57 (July 1969) (P.O. Box 1820, La Jolla, California 92037)</p> <p>This report briefly discusses Soviet development in oceanography relative to organization, manpower, and training; construction and assignment of vessels; and instrumentation, operations, and research. The author states that the Soviet organization serves the nation's national interest exclusively and that all effort is governmental regardless of the apparent basis for its existence.</p> <p>Oceanographic studies in the Soviet Union apparently are centered in three organizational entities of the government: (1) The U.S.S.R. State Committee for the Coordination of Scientific Research, which has control over the functions of the Academies of Science and the Ministry of Higher and Specialized Secondary Education; (2) the main administration of the Hydrometeorological Service, with its institutes, observational networks, instrument manufacturing plants, and other related facilities; and (3) the U.S.S.R. Committee for Fish Economy, which controls the All-Union Scientific Research Institute of Marine Fisheries and Oceanography and its subordinate branches. Two other organizational units also have oceanographic functions: The Ministry of Defense, with its all-ocean Hydrographic Service, and (2) the Ministry of Geology and Mineral Resources, which controls the marine branch of the All-Union Institute of Geophysical Methods of Prospecting. [1 organizational flow chart; 4 illustrations] [Abstracter: F. T. Piskur]</p> <p>COMMERCIAL FISHERIES ABSTRACTS    VOL 22    NO 11    PAGE    21 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p>



<p>0.35 (0.4)</p> <p>PHYSICS AND BIOLOGY: CLOSING THE GAP</p> <p>Bernhard, Robert Scientific Research 4, No. 13, 17-20 (June 23, 1969) (McGraw-Hill Inc., McGraw-Hill Building, 330 W. 42nd Street, New York, N.Y. 10036)</p> <p>The gap between physics and biology is nowhere more evident than in considerations of how the manifold biochemical events in the cell are timed and coordinated properly--the physicochemical laws applied in biology deal only with the thermodynamic aspects of molecular structure and function or with the kinetics of isolated biochemical reactions. Now a theoretical biologist at the University of Sussex (Falmer, Brighton, England) is evolving a model that may eventually provide biology with the same kind of unifying laws that physics now has. Although his theory is still tentative, he has discovered a new quantity, the "talandic" temperature, that for the first time permits the merger of thermodynamics with parameters of cell organization. Talandic temperature is an observable quantity that indicates how energy will be distributed among the interacting, feedback control systems that regulate the activity of genes and the synthesis of messenger RNA (ribonucleic acid) and proteins. The basic concept is that the cell is a resonating system made up of coupled oscillators; the talandic temperature, then, is a measure of the cell's tendency to shift spontaneously between various resonant modes--oscillator energy flows from one oscillator to another in the direction of the negative gradient of the talandic temperature. The article describes the steps by which this concept was derived.</p> <p>[1 figure]</p> <p>[Abstracter: L. Baldwin]</p>	<p>2.05 (6.55, 9.3)</p> <p>SALMONELLA REPORT INCLUDES SUGGESTIONS DEALING WITH FEED</p> <p>Anonymous Feedstuffs 41, No. 28, 1, 4 (July 12, 1969)</p> <p>"An Evaluation of the Salmonella Problem," the report of a special committee of the National Research Council (made under contract with the Food and Drug Administration and the U.S. Department of Agriculture), is now available. The report includes recommendations affecting both the feed industry and the animal-agriculture industry. Among those affecting the feed industry are the following. Federal and state agencies should develop and implement programs designed to control salmonella contamination of feeds and feed ingredients. Regulations should define inspection responsibilities and interagency relations. Such considerations as terminal pasteurization of animal byproducts, protection of animal feeds from animal-borne recontamination, design of plants to improve control of air-borne contamination and cross-contamination of feeds during manufacture should be treated as of most importance. Clean, sanitized carriers should be provided, and common transportation with other products in trucks, railroad cars, and other common carriers should be prevented.</p> <p>Copies of the full report are available for \$6 per copy from the Printing and Publishing Office, National Research Council, 2101 Constitution Avenue N.W., Washington, D.C. 20418. Single copies of the recommendations only are available from the Press Service, U.S. Department of Agriculture, Washington, D.C. 20250, or from the Press Relations Staff (CE 300), Office of Education and Information, Food and Drug Administration, Department of Health, Education and Welfare, Washington, D.C. 20204.</p> <p>[Abstracter: L. Baldwin]</p>
<p>0.321</p> <p>SPIN-LABELED HEMOGLOBIN DERIVATIVES IN SOLUTION, POLYCRYSTALLINE SUSPENSIONS, AND SINGLE CRYSTALS</p> <p>McConnell, H. M., W. Deal, and R. T. Ogata (Stauffer Laboratory for Physical Chemistry, Stanford, California 94305) Biochemistry 8, No. 6, 2580-2585 (June 1969)</p> <p>The results of a comparative study of the paramagnetic resonance of the carbon monoxy, met, met azide, and met fluoride derivatives of spin-labeled horse hemoglobin in solution, in polycrystalline suspensions, and in single crystals are presented. The authors undertook the study for two reasons: (1) to compare the resonance spectra of hemoglobin in solution and in single crystals so they could probe the conformational differences in these two states, since such spin-label spectra depend on the local protein conformation in the vicinity of the label; and (2) to interpret the paramagnetic resonance spectra of carbonmonoxy or oxyhemoglobin in solution, since the low-field hyperfine component in each is split into two signals of comparable intensity and since splitting of this type has never been seen for labels dissolved in solutions of varying viscosity. The solution to these problems is important in use of spin-label technique for studying the heme-heme interaction.</p> <p>[7 figures, 15 references]</p> <p>[Abstracter: L. Baldwin]</p> <p>Funabiki, Ryuhel, and Nakoto Kandatsu (Univ. Tokyo, Tokyo, Japan) Chemical Abstracts 70, No. 9, 35710d (March 3, 1969)</p> <p>ATTEMPT TO ESTIMATE THE TYPE OF METABOLIC TURNOVER OF ACTIN BY CONTINUOUS ADMINISTRATION OF ACID HYDROLYZATE OF CARBON-14-LABELED CHLORRELLA PROTEIN</p> <p>0.36</p>	<p>0.36 (9.13, 9.19)</p> <p>THE EFFECTS OF TEMPERATURE ON THE SUSCEPTIBILITY OF BLUEGILLS AND RAINBOW TROUT TO SELECTED PESTICIDES</p> <p>Macek, Kenneth J., Curt Hutchinson, and Oliver B. Cope (Fish-Pesticide Laboratory, U.S. Bureau of Sport Fisheries and Wildlife, Columbia, Missouri) Bulletin of Environmental Contamination and Toxicology 4, No. 3, 174-183 (May-June 1969)</p> <p>Bridges (1965), Mahdi (1966), and Walker (1963) have suggested that temperature can have a marked effect on the susceptibility of fish to pesticides. The interaction of environmental factors, such as temperature, must be considered in the evaluation of possible hazards of pesticides to fish. The present report presents the results of a 5-year study of the effects of temperature on the susceptibility of rainbow trout (<i>Salmo gairdneri</i> Richardson) and bluegills (<i>Lepomis macrochirus</i> Rafinesque) to 15 commercially available pesticides.</p> <p>The authors found, generally, an increase in the susceptibility of fish to most pesticides as temperature increases. This temperature-related reaction of fish to pesticides is not completely understood. Nevertheless, the general effect of temperature is clear, and the authors emphasize the need for considering the interaction between pesticides and environmental factors when determining safe levels of such compounds in aquatic habitats.</p> <p>[3 tables, 7 references]</p> <p>[Abstracter: F. T. Piskur]</p>



Felipe, D., et al.

Revue de la Conserve 24, No. 12, 126 (1968)  
Food Manufacture 44, No. 4, 43 (April 1969)

A new heating technique for use during freeze-drying consists of a controlled combination of infrared and microwave radiation. Foodstuffs, preferably frozen, are placed in the freeze-dryer, which is kept at between  $-40^{\circ}$  and  $-35^{\circ}$  C., and heated to  $-1^{\circ}$  C. by infrared rays. Then only the high-frequency radiation is applied; it has to heat the foodstuff by only  $1^{\circ}$  or  $2^{\circ}$  C. These conditions prevail throughout the whole freeze-drying cycle, the temperature of the product being adjusted exclusively by heat from the infrared rays. The final temperature of the water from the product is the result of the combined thermal application, so the process is simpler and much more economical than conventional processes are. Although the time required for the mixed heating is the same as for microwave heating alone, a 75 percent time saving can be achieved, since 10-12 cycles instead of 3 are attainable every 24 hours. Other advantages are summarized.

Chemical Abstracts 70, No. 21, 95544n (May 26, 1969)  
[Abstracter: L. Baldwin]

Dabrowski, Teofil, Edward Kolakowski, K. Markiewicz, Hochschule, Szczecin, Poland

HISTAMINE AS A CRITERION OF THE FRESHNESS OF FISH.  
I. CHANGES IN TISSUE IMIDAZOLE DERIVATIVES  
IN BALDIC HERRING STORED AT  $0^{\circ}$  TO  $+2^{\circ}$

3.2499  
COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 23  
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE.

Kaghan, W. S. (Olin Film Division, Pisgah Forest, North Carolina)  
Modern Packaging 42, No. 7, 103-106 (July 1969)

Although glassine coated on both sides with polyvinylidene chloride (PVDC) has characteristics that make it more valuable for certain uses than cellophane or saran-coated polypropylene films, no such PVDC has been commercially available, to the author's knowledge, up to now. This article reports the results of a laboratory evaluation of a new polymer-coated glassine (PCG) recently introduced by the author's firm.

The six types of PCG being offered commercially were tested: a 25-lb., a 30-lb., and a 35-lb. (per 3,000 sq. ft. ream) weight, each in white opaque and bleached white (translucent). According to the results presented here, all showed excellent resistance to oxygen and moisture permeation and to grease. Their machinability and heat-sealability on vertical form/fill/seal machines were outstanding, as were their durability (particularly at reduced temperatures), their coating symmetry, resistance to curl, compatibility with a broad range of printing inks, resistance to degradation during passage over forming collars of the form/fill/seal equipment, and film-release facility during crimping. The broader crimp-jaw heat-sealing range, coupled with the jaw-release capability, should make for simpler, more economic operation. The superior barrier properties make for extra shelf life, which should extend food manufacturers' allowable distribution cycle.

[Abstracter: L. Baldwin]

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Nicol, D. L. (Department of Scientific and Industrial Research, Torry Research Station, Aberdeen, Scotland)  
Torry Advisory Note No. 8 (n.d.) (Department of Scientific and Industrial Research, Torry Research Station, Aberdeen, Scotland)  
Modern Refrigeration and Air Conditioning 72, No. 855, 44-46 (June 1969)

Problem.--One of the most difficult problems in the distribution of frozen fish is the maintenance of product temperature during transit. Frozen fish that are warming up remain hard and look and feel exactly like fish at lower temperatures. Nevertheless they are spoiling. The only way of monitoring this change is by continuously measuring the temperature of the fish.

Recommendations.--To forestall the warming process, the author recommends that the following precautions be taken:

Loading and unloading times, including door-opening time, be kept to a minimum.

The fish be protected during loading and unloading.  
Cold air be allowed to circulate freely around walls, floor, and roof of insulated containers.

Insulation be of good quality material and adequately thick (4 in. of insulation with an air space between cargo and container is more effective than 5 in. of insulation with no air space).

The fish be delivered to the customer in the best condition possible.

[Abstracter: L. Baldwin]

[3 diagram drawings]

COMMERCIAL FISHERIES ABSTRACTS VOL 22 NO 11 PAGE 23  
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE.

### 3.3 (1.013) COMERCIALIZACION DE CONSERVAS DE PESCADO EN CHILE [COMMERCIALIZATION OF CANNED FISH IN CHILE]

Maschke, Arturo Purcell

Publones Inst. Fom. pesq. Santiago, Publicación No. 41, ii + 37 pp. (1969) (In Spanish; English summary)

In this report, the author examines the basic aspects of the commercialization and consumption of canned fish and shellfish in Chile. The examination covers the installed capacity of the Chilean canning industry, the level and growth of production, the available supply of canned fish in the market, and the factors affecting both the future consumption of canned fish and the development of the industry. The different wholesale and retail distribution channels are examined so that the market, both in the country as a whole and by geographical areas, can be analyzed. In addition, the factors that influence demand--for example, the price of the product and the per capita income of the consumers--are analyzed in detail. Finally, consumption figures, showing maximum and minimum values, are estimated for 1970 and 1975.

[Abstracter: L. Baldwin]

[1 flow chart, 29 tables, 9 references, 2 appendices]

[Abstracter: F. T. Pliskur]

The fish are cooked under pressure, vacuum packed with a water-absorbing food (such as wheat gluten cake), and frozen.

Japanese Patent 6204/69  
Yayoi Shokuhin K.K. (pat.)  
Food Technology 23, No. 8, 38 (August 1969)

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DRIED MEAT PRODUCT AND METHOD OF MAKING SAME

6.54  
(3.63)

U.S. Patent 3,432,411  
Gruner, Ernst Otto (pat.)  
National Provisioner 160, No. 26, 29 (June 28, 1969)

Beef, pork, fowl, and fish, alone or as a mixture, are divided into two parts--the major part consists of chunks and the minor part of comminuted meat. Each part is mixed with preservative sodium chloride and, if the meat is to be cured, with a curing salt. The two parts are mixed, put into a mold, and frozen; then the molded meat is softened by slight warming, sliced thin, and heated to at least 160° F. to bind the parts together. Finally, the slices are cooled and dehydrated.

[Abstracter: L. Baldwin]

Sausage material that has been formed into a cylinder shape is moved by an endless belt first through a tubular-shaped heating structure, where the sausage material is partially cooked, and then through a cooling structure.

[Abstracter: L. Baldwin]

APPARATUS FOR FORMING SAUSAGE

6.54

U.S. Patent 4,421,434  
Kraichner, Robert C. (pat.)  
Geo. A. Hormel & Co. (Austin, Minnesota)  
National Provisioner 160, No. 26, 28 (June 28, 1969)

COMMERCIAL FISHERIES ABSTRACTS VOL. 22 NO. 11 PAGE 25  
UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE

THE DETERMINATION OF PROTEIN IN BIOLOGICAL MATERIALS AND FOODSTUFFS

15.7

Corsuch, T. T. (Ranks Hovis McDougall Ltd., Millocrat House, 53 Eastcheap, London, E.C.3, England), and R. L. Norton  
Journal of Food Technology 4, No. 1, 1-6 (March 1969)

The determination of protein in materials containing variable amounts of non-protein nitrogen often gives anomalous results. The present report gives results of a study of three methods for determining protein--the Folin, dye-binding, and nitration procedures--as applied to mycelial systems, flour, and dried egg.

The authors found that all three methods gave different results when different proteins were used as standards, indicating that the values obtained from the different samples are only relative rather than absolute. To obtain absolute values, a standard curve must be prepared using a sample of the pure protein under investigation. Tables, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

[Abstracter: T. F. Fiskur]

A literature survey confirms that jellied meats of medium quality do not contain more than 50 percent jelly; the analytical examination of jellied meats during the manufacturing process is discussed.

[Abstracter: L. Baldwin]

EVALUATION OF JELLIED MEATS

7.89  
(3.336)

Bartels, H., and R. Hadlok  
Fleischwirtschaft 48, 1613 (1968)  
Food Manufacture 44, No. 4, 46 (April 1969)

COMMERCIAL FISHERIES ABSTRACTS VOL. 22 NO. 11 PAGE 25  
UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE

9.2  
(1.013)

ESTUDOS SÔBRE A PESCA NA ZONA LITORÂNEA  
DOS ESTADOS DO RIO GRANDE DO NORTE E PARAÍBA  
[STUDIES OF THE INSHORE FISHERY IN THE STATES  
OF RIO GRANDE DO NORTE AND PARAÍBA]

Ferreira, Marçílio Vieira, Sílvia Barbosa de Moraes, and Flávio Rodrigues Lima (SUDENE)  
Boletim de Estudos de Pesca 7, No. 3, 27-59 + 8 appendix pp. (September-December 1967) (In Portuguese; English summary)

**Purpose.**--This study had a twofold purpose: to supplement previous studies of the general conditions of the operating fisheries in two cities in Paraíba and five cities in Rio Grande do Norte, and to appraise fishery resources in these two states so that a new investment policy could be formulated for the region.

**Action.**--Regional conditions (electric power supplies, roads and railroads, transportation and communication facilities, docks and anchorages, shipyards, fuel, supplies, workshops, refrigeration facilities), the fisheries situation (number of fishermen, type and number of vessels, kinds of gear used and their effectiveness, fish caught, preservation and marketing of the catch), and the socio-economic conditions of the practicing fishermen were surveyed. Using the research vessel "Serra Azul," exploratory fishing was conducted in the areas fished from the survey region. [7] figures, 10 tables [Abstracter: L. Baldwin]

COMMERCIAL FISHERIES ABSTRACTS VOL. 22 NO. 11 PAGE 25  
UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE

LIQUID SUPPLEMENTS FOR LIVESTOCK FEEDING

9.6  
(901.9)

Anonymous  
Liquid Supplements for Livestock Feeding, 91 pp. (1969) (Agricultural Division, Chas. Pfizer & Co., Inc., 235 East 42nd Street, New York, N.Y. 10017)

This is an expansion of Technical Data Report No. 6, entitled "Liquid Supplements," published earlier. It is of use to manufacturers and users of liquid supplements (including fish solubles). The 25 major sections of the book include sections dealing with definitions, history, manufacturers, feeding applications, species and levels, ration formulation, liquid vehicles, nonprotein nitrogen sources, phosphorus sources, additives, product formulation, advantages of liquid supplements, problems with liquid supplements, vitamin addition and stability, antibiotic addition and stability, other additives, feeding trial data, quality control, and equipment and materials of construction.

[References: 225 references] [Abstracter: F. T. Fiskur]

9.19  
RADIOACTIVE WASTE CONTROL AT THE UNITED KINGDOM  
ATOMIC RESEARCH ESTABLISHMENT, HARWELL  
Burns, Ronald H., G. W. Clare, and Joseph H. Clarke (Chem. Eng. Div., At. Energy Res. Estab., Harwell, England)  
Chemical Abstracts 70, No. 12, 50314w (March 24, 1969)

COMMERCIAL FISHERIES ABSTRACTS VOL. 22 NO. 11 PAGE 25  
UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE



Plunk, W., and R. A. Macdonald  
Gordian 58, 531 (1968)  
Food Manufacture 74, No. 4, 15 (April 1969)

Various hydrocolloids--in particular carboxy-methylcellulose, methylcellulose, alginate, pectin, and carrageen--used as texturizers, thickeners, jelly formers, and stabilizers in the food industry were heat treated at different temperatures and stabilizers for varying amounts of time, and the viscosity and gelling capacity were measured to show thermal degradation and changes in chemical structure. The results presented in a number of graphs (the stability of gelling agents. Practically all uses of hydrocolloids are recommended. [Abstracter: L. Baldwin]

[Abstracter: L. Baldwin]

1967. [2 figures, 3 tables, 57 references] [Abstracter: L. Baldwin]

In 1963, Dixon and Norman showed that the reaction between titanous chloride and hydrogen peroxide in the presence of an organic substrate within an aqueous flow system is an effective method of generating transient free radicals for the purpose of observing electron paramagnetic resonance. The investigation reported here concerned an extension of the method to a range of simple oximes. The result showed that all aliphatic oximes were highly reactive and underwent hydroxyl radical addition to the carbon of the C=N bond; the few aromatic oximes studied were unreactive. These results confirm and extend those obtained by Adams in 1967. [2 figures, 3 tables, 57 references] [Abstracter: L. Baldwin]

#### 7.599 ELECTRON PARAMAGNETIC RESONANCE SPECTROSCOPIC STUDY OF NITROXIDE RADICALS FORMED FROM OXIMES

Smith, P., and W. M. Fox (Department of Chemistry, Duke University, Durham, North Carolina 27706)

Canadian Journal of Chemistry 47, No. 12, 2227-2236 (June 15, 1969)

James E. Anderson, William D. Paynter, Felix E. Kasbaum, and Woodrow W. Kiehlmeier (pat.)

Oscar Mayer & Co., Inc. (Chicago, Ill.)

(6961, 82 June) 82, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

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The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States — now and in the future.